COMMISSION ON ACCREDITATION FOR CORRECTIONS

Texas Department of Criminal Justice
Hutchins Unit
Dallas, Texas

January 11-13, 2010

Visiting Committee Findings

Non-Mandatory Standards

Non-Compliance

Standard #4-4062

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT EMPLOYEES WHO HAVE DIRECT CONTACT WITH INMATES RECEIVE A PHYSICAL EXAMINATION PRIOR TO JOB ASSIGNMENT. ALL OTHER EMPLOYEES RECEIVE A MEDICAL SCREENING PRIOR TO JOB ASSIGNMENT. EMPLOYEES RECEIVE REEXAMINATIONS ACCORDING TO A DEFINED NEED OR SCHEDULE.

FINDINGS:

TDCJ policy does not require physical exams prior to being hired.

AGENCY RESPONSE

Waiver

A Systemic Waiver was granted for this standard.

AUDITOR'S RESPONSE

Systemic waiver is requested, Audit Team concurs

Standard #4-4147-1 Added August 2006.

ALL INMATE ROOMS/CELLS PROVIDE INMATES WITH ACCESS TO NATURAL LIGHT BY MEANS OF AT LEAST THREE SQUARE FEET OF TRANSPARENT GLAZING, PLUS TWO ADDITIONAL SQUARE FEET OF TRANSPARENT GLAZING PER INMATE IN ROOMS/CELLS WITH THREE OR MORE INMATES. (RENOVATION, ADDITION, NEW CONSTRUCTION)

FINDINGS:

Due to construction, some dayroom areas do not have windows allowing natural light.

AGENCY RESPONSE

Waiver

Dormitories and cells are located in the building's interior, and the cell walls are shared with other offender housing or service areas. Based on the design of the building, the installation of windows to satisfy the standard is not feasible. Each room/cell is equipped with artificial lighting in order to facilitate reading and letter writing activities, and depending on the offender's classification may be allowed to exit the living areas daily for outdoor recreation where natural light is available. TDCJ and the Hutchins Unit request a waiver for standard #4-4147-1.

AUDITOR'S RESPONSE

Waiver is requested, Audit Team concurs

Standard #4-4149 Revised January 2003.

EACH DAYROOM PROVIDES INMATES WITH ACCESS TO NATURAL LIGHT BY MEANS OF AT LEAST 12 SQUARE FEET OF TRANSPARENT GLAZING IN THE DAYROOM, PLUS TWO ADDITIONAL SQUARE FEET OF TRANSPARENT GLAZING PER INMATE WHOSE ROOM/CELL IS DEPENDENT ON ACCESS TO NATURAL LIGHT THROUGH THE DAYROOM. (NEW CONSTRUCTION ONLY)

FINDINGS:

Due to construction, some dorm areas do not have windows allowing natural light.

AGENCY RESPONSE

Waiver

Dayrooms are located in the interior of the building, and do not provide a possible location for window placement. Each dayroom is equipped with artificial lighting in order to facilitate reading and letter writing activities, and depending on the offender's classification may be allowed to exit the living areas daily for outdoor recreation where natural light is available. TDCJ and the Hutchins Unit request a waiver for standard #4-4149.

AUDITOR'S RESPONSE

Waiver is requested, Audit Team concurs

Standard #4-4150

NOISE LEVELS IN INMATE HOUSING UNITS DO NOT EXCEED 70 DBA (A SCALE) IN DAYTIME AND 45 DBA (A SCALE) AT NIGHT.

FINDINGS:

Offender housing does not meet noise requirement for night time (the 45 dBA minimum night level is 46dBA at best measured in several areas).

AGENCY RESPONSE

Discretionary Compliance

The Hutchins Unit was in compliance with all mandatory standards and 98.8% of the non-mandatory standards at the time of the audit, and is submitting a Discretionary Compliance Request on Standard #4-4150.

AUDITOR'S RESPONSE

Discretionary compliance is requested, Audit Team concurs

Standard #4-4270

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT INMATES IN SEGREGATION RECEIVE A MINIMUM OF ONE HOUR OF EXERCISE PER DAY OUTSIDE THEIR CELLS, FIVE DAYS PER WEEK, UNLESS SECURITY OR SAFETY CONSIDERATIONS DICTATE OTHERWISE.

FINDINGS:

TDCJ policy does not allow recreation for solitary status offenders.

AGENCY RESPONSE

Discretionary Compliance

The Texas Department of Criminal Justice (TDCJ) is compliant with Standard #4-4270 in all areas of segregation, except solitary confinement. Solitary confinement is a punitive action that can only be assessed after an offender is found guilty at disciplinary hearing for a major offense (e.g. staff assault). TDCJ requests discretionary compliance with standard 4-4270.

AUDITOR'S RESPONSE

Discretionary compliance is requested, Audit Team concurs

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Mandatory Standards

Not Applicable

Standard #4-4191

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT WHEN AN OFFENDER IS PLACED IN A FOUR/FIVE-POINT RESTRAINT (ARMS, HEAD AND LEGS SECURED), ADVANCE APPROVAL MUST BE OBTAINED FROM THE WARDEN/SUPERINTENDENT OR DESIGNEE. SUBSEQUENTLY, THE HEALTH AUTHORITY OR DESIGNEE MUST BE NOTIFIED TO ASSESS THE INMATE'S MEDICAL AND MENTAL HEALTH CONDITION, AND TO ADVISE WHETHER, ON THE BASIS OF SERIOUS DANGER TO SELF OR OTHERS, THE INMATE SHOULD BE PLACED IN A MEDICAL/MENTAL HEALTH UNIT FOR EMERGENCY INVOLUNTARY TREATMENT WITH SEDATION AND/OR OTHER MEDICAL MANAGEMENT, AS APPROPRIATE. IF THE OFFENDER IS NOT TRANSFERRED TO A MEDICAL/MENTAL HEALTH UNIT AND IS RESTRAINED IN A FOUR/FIVE-POINT POSITION, THE FOLLOWING MINIMUM PROCEDURES WILL BE FOLLOWED:

- DIRECT VISUAL OBSERVATION BY STAFF MUST BE CONTINUOUS PRIOR TO OBTAINING APPROVAL FROM THE HEALTH AUTHORITY OR DESIGNEE
- SUBSEQUENT VISUAL OBSERVATION MUST BE MADE AT LEAST EVERY 15 MINUTES
- RESTRAINT PROCEDURES ARE IN ACCORDANCE WITH GUIDELINES ENDORSED BY THE DESIGNATED HEALTH AUTHORITY.

FINDINGS:

4/5 point Medical restraints are not used by the Medical Department at the Hutchins Unit

AGENCY RESPONSE

Waiver

Dayrooms are located in the interior of the building, and do not provide a possible location for window placement. Each dayroom is equipped with artificial lighting in order to facilitate reading and letter writing activities, and depending on the offender's classification may be allowed to exit the living areas daily for outdoor recreation where natural light is available. TDCJ and the Hutchins Unit request a waiver for standard #4-4149.

Standard #4-4353

IF FEMALE OFFENDERS ARE HOUSED, ACCESS TO PREGNANCY MANAGEMENT IS SPECIFIC AS IT RELATES TO THE FOLLOWING:

- PREGNANCY TESTING
- ROUTINE PRENATAL CARE
- HIGH-RISK PRENATAL CARE
- MANAGEMENT OF THE CHEMICALLY ADDICTED PREGNANT INMATE
- POSTPARTUM FOLLOW-UP
- UNLESS MANDATED BY STATE LAW, BIRTH CERTIFICATES/REGISTRY DOES NOT LIST A CORRECTIONAL FACILITY AS THE PLACE OF BIRTH

FINDINGS:

The Hutchins Unit does not house female offenders

Standard #4-4376

DETOXIFICATION IS DONE ONLY UNDER MEDICAL SUPERVISION IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL LAWS. DETOXIFICATION FROM ALCOHOL, OPIATES, HYPNOTICS, OTHER STIMULANTS, AND SEDATIVE HYPNOTIC DRUGS IS CONDUCTED UNDER MEDICAL SUPERVISION WHEN PERFORMED AT THE FACILITY OR IS CONDUCTED IN A HOSPITAL OR COMMUNITY DETOXIFICATION CENTER. SPECIFIC GUIDELINES ARE FOLLOWED FOR THE TREATMENT AND OBSERVATION OF INDIVIDUALS MANIFESTING MILD OR MODERATE SYMPTOMS OF INTOXICATION OR WITHDRAWAL FROM ALCOHOL AND OTHER DRUGS.

FINDINGS:

This facility does not provide detoxification service

Standard #4-4401

THE INVOLUNTARY ADMINISTRATION OF PSYCHOTROPIC MEDICATION(S) TO AN OFFENDER IS GOVERNED BY APPLICABLE LAWS AND REGULATIONS OF THE JURISDICTION. WHEN ADMINISTERED, THE FOLLOWING CONDITIONS MUST BE MET:

- AUTHORIZATION IS BY A PHYSICIAN WHO SPECIFIES THE DURATION OF THERAPY
- LESS RESTRICTIVE INTERVENTION OPTIONS HAVE BEEN EXERCISED WITHOUT SUCCESS AS DETERMINED BY THE PHYSICIAN OR PSYCHIATRIST
- DETAILS ARE SPECIFIED ABOUT WHY, WHEN, WHERE, AND HOW THE MEDICATION IS TO BE ADMINISTERED
- MONITORING OCCURS FOR ADVERSE REACTIONS AND SIDE EFFECTS
- TREATMENT PLAN GOALS ARE PREPARED FOR LESS RESTRICTIVE TREATMENT ALTERNATIVES AS SOON AS POSSIBLE

FINDINGS:

This facility does not compel psychotropic medications

Standard #4-4405

THE USE OF RESTRAINTS FOR MEDICAL AND PSYCHIATRIC PURPOSES IS DEFINED, AT A MINIMUM, BY THE FOLLOWING:

- CONDITIONS UNDER WHICH RESTRAINTS MAY BE APPLIED
- TYPES OF RESTRAINTS TO BE APPLIED
- IDENTIFICATION OF A QUALIFIED MEDICAL OR MENTAL HEALTH PRACTITIONER WHO MAY AUTHORIZE THE USE OF RESTRAINTS AFTER REACHING THE CONCLUSION THAT LESS INTRUSIVE MEASURES WOULD NOT BE SUCCESSFUL
- MONITORING PROCEDURES FOR OFFENDERS IN RESTRAINTS
- LENGTH OF TIME RESTRAINTS ARE TO BE APPLIED
- DOCUMENTATION OF EFFORTS FOR LESS RESTRICTIVE TREATMENT ALTERNATIVES AS SOON AS POSSIBLE
- AN AFTER-INCIDENT REVIEW

FINDINGS:

Medical restraints are not used by the Medical Department at the Hutchins Unit

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Visiting Committee Findings

Non-Mandatory Standards

Not Applicable

Standard #4-4057

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT ALL PERSONNEL COVERED BY MERIT SYSTEMS, CIVIL SERVICE REGULATIONS, OR UNION CONTRACTS ARE SELECTED, RETAINED, AND PROMOTED ON THE BASIS OF MERIT AND SPECIFIED QUALIFICATIONS. NEW EMPLOYEES RECEIVE CREDIT FOR THEIR PRIOR TRAINING.

FINDINGS:

TDCJ employees are not covered by merit system, or union

Standard #4-4059

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT EMPLOYEES COVERED BY MERIT SYSTEMS, CIVIL SERVICE REGULATIONS, OR UNION CONTRACT ARE APPOINTED INITIALLY FOR A PROBATIONARY TERM OF AT LEAST SIX MONTHS BUT NO LONGER THAN ONE YEAR.

FINDINGS:

TDCJ employees are not covered by merit system, or union

Standard #4-4143

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE FOR THE ASSIGNMENT OF APPROPRIATELY TRAINED INDIVIDUALS TO ASSIST DISABLED OFFENDERS WHO CANNOT OTHERWISE PERFORM BASIC LIFE FUNCTIONS.

FINDINGS:

The Hutchins Unit does not house totally disabled offenders

Standard #4-4147

ALL INMATE ROOMS/CELLS PROVIDE INMATES WITH ACCESS TO NATURAL LIGHT BY MEANS OF AT LEAST THREE SQUARE FEET OF TRANSPARENT GLAZING, PLUS TWO ADDITIONAL SQUARE FEET OF TRANSPARENT GLAZING PER INMATE IN ROOMS/CELLS WITH THREE OR MORE INMATES.

FINDINGS:

The Hutchins Unit is considered 'New Construction' therefore this standard is non-applicable

Standard #4-4152

CIRCULATION IS AT LEAST 15 CUBIC FEET OF OUTSIDE OR RE-CIRCULATED FILTERED AIR PER MINUTE PER OCCUPANT FOR CELLS/ROOMS, OFFICER STATIONS, AND DINING AREAS, AS DOCUMENTED BY A QUALIFIED TECHNICIAN AND SHOULD BE CHECKED NOT LESS THAN ONCE PER ACCREDITATION CYCLE. (RENOVATION, ADDITION, NEW CONSTRUCTION ONLY)

FINDINGS:

The Hutchins Unit is considered 'New Construction' therefore this standard is non-applicable

Standard #4-4181

WRITTEN POLICY, PROCEDURE, AND PRACTICE REQUIRE THAT WHEN BOTH MALES AND FEMALES ARE HOUSED IN THE FACILITY, AT LEAST ONE MALE AND ONE FEMALE STAFF MEMBER ARE ON DUTY AT ALL TIMES.

FINDINGS:

The Hutchins Unit is an adult male unit and does not house female offenders

Standard #4-4208

WHERE A CANINE UNIT EXISTS, POLICY, PROCEDURE, AND PRACTICED PROVIDE THE FOLLOWING:

- A MISSION STATEMENT, INCLUDING GOALS AND OBJECTIVES EMERGENCY PLANS THAT ARE INTEGRATED INTO THE

OVERALL EMERGENCY PLANS OF THE FACILITY

FINDINGS:

The Hutchins Unit does not have a canine program

Standard #4-4209

WHERE A CANINE UNIT EXISTS, POLICY, PROCEDURE, AND PRACTICE FOR TRAINING OF HANDLERS/DOG TEAMS AND UPKEEP AND CARE OF THE ANIMALS PROVIDE FOR THE FOLLOWING:

- CRITERIA FOR SELECTION, TRAINING, AND CARE OF ANIMALS
- CRITERIA FOR SELECTION AND TRAINING REQUIREMENTS OF HANDLERS
- AN APPROVED SANITATION PLAN WHICH COVERS INSPECTION, HOUSING, TRANSPORTATION, AND DAILY GROOMING FOR DOGS

EACH HANDLER/DOG TEAM SHOULD BE TRAINED, CERTIFIED, AND RE-CERTIFIED ANNUALLY BY A NATIONALLY RECOGNIZED ACCREDITING BODY OR A COMPARABLE INTERNAL TRAINING AND PROFICIENCY TESTING PROGRAM.

WHERE A CANINE UNIT EXISTS, POLICY, PROCEDURE, AND PRACTICE FOR TRAINING OF HANDLERS/DOG TEAMS AND UPKEEP AND CARE OF THE ANIMALS PROVIDE FOR THE FOLLOWING:

- CRITERIA FOR SELECTION, TRAINING, AND CARE OF ANIMALS
- CRITERIA FOR SELECTION AND TRAINING REQUIREMENTS OF HANDLERS
- AN APPROVED SANITATION PLAN WHICH COVERS INSPECTION, HOUSING, TRANSPORTATION, AND DAILY GROOMING FOR DOGS

EACH HANDLER/DOG TEAM SHOULD BE TRAINED, CERTIFIED, AND RE-CERTIFIED ANNUALLY BY A NATIONALLY RECOGNIZED ACCREDITING BODY OR A COMPARABLE INTERNAL TRAINING AND PROFICIENCY TESTING PROGRAM.

FINDINGS:

The Hutchins Unit does not have a canine program

Standard #4-4210

WHERE A CANINE UNIT EXISTS, POLICY, PROCEDURE, AND PRACTICE PROVIDE DAILY AND CURRENT RECORDS ON TRAINING, CARE OF DOGS, AND SIGNIFICANT EVENTS.

FINDINGS:

The Hutchins Unit does not have a canine program

Standard #4-4251

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT AN INMATE IS ADMITTED TO THE SEGREGATION UNIT FOR PROTECTIVE CUSTODY ONLY WHEN THERE IS DOCUMENTATION THAT PROTECTIVE CUSTODY IS WARRANTED AND NO REASONABLE ALTERNATIVES ARE AVAILABLE.

FINDINGS:

The Hutchins Unit does not house protective custody offenders

Standard #4-4254

WRITTEN POLICY, PROCEDURE, AND PRACTICE SPECIFY THE REVIEW PROCESS USED TO RELEASE AN INMATE FROM ADMINISTRATIVE SEGREGATION AND PROTECTIVE CUSTODY.

FINDINGS:

Inmates may not be released from Administrative Segregation or Protective Custody due to the average length of stay (180 days)

Standard #4-4278

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT MALE AND FEMALE INMATES HOUSED IN THE SAME INSTITUTION HAVE SEPARATE SLEEPING QUARTERS BUT EQUAL ACCESS TO ALL AVAILABLE SERVICES AND PROGRAMS. NEITHER SEX IS DENIED OPPORTUNITIES SOLELY ON THE BASIS OF THEIR SMALLER NUMBER IN THE POPULATION.

FINDINGS:

The Hutchins Unit is an adult male unit and does not house female offenders

Standard #4-4307

IF YOUTHFUL OFFENDERS ARE HOUSED IN THE FACILITY, WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT THEY ARE HOUSED

IN A SPECIALIZED UNIT FOR YOUTHFUL OFFENDERS EXCEPT WHEN:

- A VIOLENT, PREDATORY YOUTHFUL OFFENDER POSES AN UNDUE RISK OF HARM TO OTHERS WITHIN THE SPECIALIZED UNIT; AND/OR
- A QUALIFIED MEDICAL OR MENTAL-HEALTH SPECIALIST DOCUMENTS THAT THE YOUTHFUL OFFENDER WOULD BENEFIT FROM PLACEMENT OUTSIDE THE UNIT

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE FOR THE PREPARATION OF A WRITTEN STATEMENT OF THE SPECIFIC REASONS FOR HOUSING A YOUTHFUL OFFENDER OUTSIDE THE SPECIALIZED UNIT AND A CASE-MANAGEMENT PLAN SPECIFYING WHAT BEHAVIORS NEED TO BE MODIFIED AND HOW THE YOUTHFUL OFFENDER MAY RETURN TO THE UNIT. THE STATEMENT OF REASONS AND CASE-MANAGEMENT PLAN MUST BE APPROVED BY THE WARDEN OR HIS OR HER DESIGNEE. CASES ARE REVIEWED AT LEAST QUARTERLY BY THE CASE MANAGER, THE WARDEN OR HIS OR HER DESIGNEE, AND THE YOUTHFUL OFFENDER TO DETERMINE WHETHER A YOUTHFUL OFFENDER SHOULD BE RETURNED TO THE SPECIALIZED UNIT.

FINDINGS:

The Hutchins Unit is an adult male unit and does not house youthful offenders

Standard #4-4308

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE FOR THE DIRECT SUPERVISION OF YOUTHFUL OFFENDERS HOUSED IN THE SPECIALIZED UNIT TO ENSURE SAFETY AND SECURITY.

FINDINGS:

The Hutchins Unit is an adult male unit and does not house youthful offenders

Standard #4-4309

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE FOR CLASSIFICATION PLANS FOR YOUTHFUL OFFENDERS THAT DETERMINE LEVEL OF RISK AND PROGRAM NEEDS DEVELOPMENTALLY APPROPRIATE FOR ADOLESCENTS. CLASSIFICATION PLANS SHALL INCLUDE CONSIDERATION OF PHYSICAL, MENTAL, SOCIAL, AND EDUCATIONAL MATURITY OF THE YOUTHFUL OFFENDER.

FINDINGS:

The Hutchins Unit is an adult male unit and does not house youthful offenders

Standard #4-4310

WRITTEN POLICY, PROCEDURE, AND PRACTICE REQUIRE THAT ADEQUATE PROGRAM SPACE BE PROVIDED TO MEET THE PHYSICAL, SOCIAL, AND EMOTIONAL NEEDS OF YOUTHFUL OFFENDER AND ALLOWS FOR THEIR PERSONAL INTERACTIONS AND GROUP-ORIENTED ACTIVITIES.

FINDINGS:

The Hutchins Unit is an adult male unit and does not house youthful offenders

Standard #4-4311

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT YOUTHFUL OFFENDERS IN THE SPECIALIZED UNIT FOR YOUTHFUL OFFENDERS HAVE NO MORE THAN INCIDENTAL SIGHT OR SOUND CONTACT WITH ADULT OFFENDERS FROM OUTSIDE THE UNIT IN LIVING, PROGRAM, DINING, OR OTHER COMMON AREAS OF THE FACILITY. ANY OTHER SIGHT OR SOUND CONTACT IS MINIMIZED, BRIEF, AND IN CONFORMANCE WITH APPLICABLE LEGAL REQUIREMENTS.

FINDINGS:

The Hutchins Unit is an adult male unit and does not house youthful offenders

Standard #4-4312

WRITTEN POLICY, PROCEDURE, AND PRACTICE REQUIRE THAT PROGRAM PERSONNEL WHO WORK WITH YOUTHFUL OFFENDERS FROM THE SPECIALIZED UNIT BE TRAINED IN THE DEVELOPMENTAL, SAFETY, AND OTHER SPECIFIC NEEDS OF YOUTHFUL OFFENDERS. WRITTEN JOB DESCRIPTIONS AND QUALIFICATIONS REQUIRE TRAINING FOR STAFF SPECIFICALLY ASSIGNED TO THE UNIT OR STAFF WHO ARE RESPONSIBLE FOR PROGRAMMING OF YOUTHFUL OFFENDERS IN THE SPECIALIZED UNIT BEFORE BEING ASSIGNED TO WORK WITH YOUTHFUL OFFENDERS. THE TRAINING SHOULD INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING AREAS:

- ADOLESCENT DEVELOPMENT
- EDUCATIONAL PROGRAMMING
- CULTURAL AWARENESS
- CRISIS PREVENTION AND INTERVENTION
- LEGAL ISSUES
- HOUSING AND PHYSICAL PLANT
- POLICIES AND PROCEDURES
- THE MANAGEMENT OF, AND PROGRAMMING FOR, SEX OFFENDERS

- SUBSTANCE-ABUSE SERVICES
- COGNITIVE-BEHAVIORAL INTERVENTIONS, INCLUDING ANGER MANAGEMENT, SOCIAL-SKILLS TRAINING, PROBLEM SOLVING, AND RESISTING PEER PRESSURE
- SUICIDE PREVENTION
- NUTRITION
- MENTAL-HEALTH ISSUES
- GENDER-SPECIFIC ISSUES
- CASE-MANAGEMENT PLANNING AND IMPLEMENTATION

FINDINGS:

The Hutchins Unit is an adult male unit and does not house youthful offenders

Standard #4-4352

OFFENDERS ARE PROVIDED ACCESS TO INFIRMARY CARE EITHER WITHIN THE CORRECTIONAL SETTING OR OFF SITE. IF INFIRMARY CARE IS PROVIDED ONSITE, IT INCLUDES, AT A MINIMUM, THE FOLLOWING:

- DEFINITION OF THE SCOPE OF INFIRMARY CARE SERVICES AVAILABLE
- A PHYSICIAN ON CALL OR AVAILABLE TWENTY-FOUR HOURS PER DAY
- HEALTH CARE PERSONNEL HAVE ACCESS TO A PHYSICIAN OR A REGISTERED NURSE AND ARE ON DUTY TWENTY-FOUR HOURS PER DAY WHEN PATIENTS ARE PRESENT
- ALL OFFENDERS/PATIENTS ARE WITHIN SIGHT OR SOUND OF A STAFF MEMBER
- AN INFIRMARY CARE MANUAL THAT INCLUDES NURSING CARE PROCEDURES
- COMPLIANCE WITH APPLICABLE STATE STATUTES AND LOCAL LICENSING REQUIREMENTS

FINDINGS:

The Hutchins Unit does not have an infirmary

Standard #4-4353

IF FEMALE OFFENDERS ARE HOUSED, ACCESS TO PREGNANCY MANAGEMENT IS SPECIFIC AS IT RELATES TO THE FOLLOWING:

- PREGNANCY TESTING
- ROUTINE PRENATAL CARE
- HIGH-RISK PRENATAL CARE

- MANAGEMENT OF THE CHEMICALLY ADDICTED PREGNANT INMATE
- POSTPARTUM FOLLOW-UP
- UNLESS MANDATED BY STATE LAW, BIRTH CERTIFICATES/REGISTRY DOES NOT LIST A CORRECTIONAL FACILITY AS THE PLACE OF BIRTH

FINDINGS:

The Hutchins Unit is an adult male unit and does not house female offenders

Standard #4-4363

ALL INTRASYSTEM TRANSFER OFFENDERS RECEIVE A HEALTH SCREENING BY HEALTH-TRAINED OR QUALIFIED HEALTH CARE PERSONNEL WHICH COMMENCES ON THEIR ARRIVAL AT THE FACILITY. ALL FINDINGS ARE RECORDED ON A SCREENING FORM APPROVED BY THE HEALTH AUTHORITY. AT A MINIMUM, THE SCREENING INCLUDES THE FOLLOWING:

INQUIRY INTO:

- WHETHER THE OFFENDER IS BEING TREATED FOR A MEDICAL OR DENTAL PROBLEM
- WHETHER THE OFFENDER IS PRESENTLY ON MEDICATION
- WHETHER THE OFFENDER HAS A CURRENT MEDICAL OR DENTAL COMPLAINT

OBSERVATION OF:

- GENERAL APPEARANCE AND BEHAVIOR
- PHYSICAL DEFORMITIES
- EVIDENCE OF ABUSE OR TRAUMA

MEDICAL DISPOSITION OF OFFENDERS:

- TO GENERAL POPULATION
- TO GENERAL POPULATION WITH APPROPRIATE REFERRAL TO HEALTH CARE SERVICE
- REFERRAL TO APPROPRIATE HEALTH CARE SERVICE FOR SERVICE FOR EMERGENCY TREATMENT

FINDINGS:

The Hutchins Unit does not have a chemical dependency program

Standard #4-4364

ALL IN-TRANSIT OFFENDERS RECEIVE A HEALTH SCREENING BY HEALTH-

TRAINED OR QUALIFIED HEALTH CARE PERSONNEL ON ENTRY INTO THE AGENCY SYSTEM. FINDINGS ARE RECORDED ON A SCREENING FORM THAT WILL ACCOMPANY THE OFFENDER TO ALL SUBSEQUENT FACILITIES UNTIL THE OFFENDER REACHES HIS OR HER FINAL DESTINATION. HEALTH SCREENS WILL BE REVIEWED AT EACH FACILITY BY HEALTH-TRAINED OR QUALIFIED HEALTH CARE PERSONNEL. PROCEDURES WILL BE IN PLACE FOR CONTINUITY OF CARE.

FINDINGS:

The Hutchins Unit does not house transient offenders.

Standard #4-4377

OFFENDERS HAVE ACCESS TO A CHEMICAL DEPENDENCY TREATMENT PROGRAM. WHEN A CHEMICAL DEPENDENCY PROGRAM EXISTS, THE CLINICAL MANAGEMENT OF CHEMICALLY DEPENDENT OFFENDERS INCLUDES, AT A MINIMUM, THE FOLLOWING:

- A STANDARDIZED DIAGNOSTIC NEEDS ASSESSMENT ADMINISTERED TO DETERMINE THE EXTENT OF USE, ABUSE, DEPENDENCY, AND/OR CO-DEPENDENCY
- AN INDIVIDUALIZED TREATMENT PLAN DEVELOPED AND IMPLEMENTED BY A MULTI DISCIPLINARY CLINICAL TEAM THAT INCLUDES MEDICAL, MENTAL HEALTH, AND SUBSTANCE ABUSE PROFESSIONALS
- PRE-RELEASE RELAPSE-PREVENTION EDUCATION, INCLUDING RISK MANAGEMENT
- THE OFFENDER SHALL BE INVOLVED IN AFTERCARE DISCHARGE PLANS

FINDINGS:

The Hutchins Unit does not have a chemical dependency program

Standard #4-4383

WHEN INSTITUTIONS DO NOT HAVE QUALIFIED HEALTH CARE STAFF, HEALTH-TRAINED PERSONNEL COORDINATE THE HEALTH DELIVERY SERVICES IN THE INSTITUTION UNDER THE JOINT SUPERVISION OF THE RESPONSIBLE HEALTH AUTHORITY AND WARDEN OR SUPERINTENDENT.

FINDINGS:

The Hutchins Unit uses only full-time qualified Health Care staff

Standard #4-4391

IF VOLUNTEERS ARE USED IN THE DELIVERY OF HEALTH CARE, THERE IS A DOCUMENTED SYSTEM FOR SELECTION, TRAINING, STAFF SUPERVISION, FACILITY ORIENTATION, AND DEFINITION OF TASKS, RESPONSIBILITIES AND AUTHORITY THAT IS APPROVED BY THE HEALTH AUTHORITY. VOLUNTEERS MAY ONLY PERFORM DUTIES CONSISTENT WITH THEIR CREDENTIALS AND TRAINING. VOLUNTEERS AGREE IN WRITING TO ABIDE BY ALL FACILITY POLICIES, INCLUDING THOSE RELATING TO THE SECURITY AND CONFIDENTIALITY OF INFORMATION.

FINDINGS:

TDCJ does not utilize volunteer Health Care Personnel

Standard #4-4393

UNLESS PROHIBITED BY STATE LAW, OFFENDERS (UNDER STAFF SUPERVISION) MAY PERFORM FAMILIAL DUTIES COMMENSURATE WITH THEIR LEVEL OF TRAINING. THESE DUTIES MAY INCLUDE:

- PEER SUPPORT AND EDUCATION
- HOSPICE ACTIVITIES
- ASSIST IMPAIRED OFFENDERS ON A ONE-ON-ONE BASIS WITH ACTIVITIES OF DAILY LIVING
- SUICIDE COMPANION OR BUDDY IF QUALIFIED AND TRAINED THROUGH A FORMAL PROGRAM THAT IS PART OF SUICIDE PREVENTION PLAN
- HANDLING DENTAL INSTRUMENTS FOR THE PURPOSE OF SANITIZING AND CLEANING, WHEN DIRECTLY SUPERVISED AND IN COMPLIANCE WITH APPLICABLE TOOL CONTROL POLICIES, WHILE IN A DENTAL ASSISTANTS TRAINING PROGRAM CERTIFIED BY THE STATE DEPARTMENT OF EDUCATION OR OTHER COMPARABLE APPROPRIATE AUTHORITY

OFFENDERS ARE NOT TO BE USED FOR THE FOLLOWING DUTIES:

- PERFORMING DIRECT PATIENT CARE SERVICES
- SCHEDULING HEALTH CARE APPOINTMENTS
- DETERMINING ACCESS OF OTHER OFFENDERS TO HEALTH CARE SERVICES
- HANDLING OR HAVING ACCESS TO SURGICAL INSTRUMENTS, SYRINGES, NEEDLES, MEDICATIONS, OR HEALTH RECORDS
- OPERATING DIAGNOSTIC OR THERAPEUTIC EQUIPMENT EXCEPT UNDER DIRECT SUPERVISION (BY SPECIALLY

TRAINED STAFF) IN A VOCATIONAL TRAINING PROGRAM

FINDINGS:

Offenders only perform janitorial duties in the Health Care unit

Standard #4-4416

WHEN STANDARD ISSUED CLOTHING PRESENTS A SECURITY OR MEDICAL RISK (FOR EXAMPLE, SUICIDE OBSERVATION), PROVISIONS ARE MADE TO SUPPLY THE OFFENDER WITH A SECURITY GARMENT THAT WILL PROMOTE OFFENDER SAFETY IN A WAY THAT IS DESIGNED TO PREVENT HUMILIATION AND DEGRADATION.

FINDINGS:

The Hutchins Unit does not utilize security clothing

Standard #4-4417

THERE ARE SUFFICIENT BATHING FACILITIES IN THE MEDICAL HOUSING UNIT AND INFIRMARY AREA TO ALLOW OFFENDERS HOUSED THERE TO BATHE DAILY.

FINDINGS:

The Hutchins Unit does not maintain a 24 hour Medical Department

Standard #4-4418

OFFENDERS HAVE ACCESS TO OPERABLE WASHBASINS WITH HOT AND COLD RUNNING WATER IN THE MEDICAL HOUSING UNIT OR INFIRMARY AREA AT A MINIMUM RATIO OF ONE BASIN FOR EVERY 12 OCCUPANTS, UNLESS STATE OR LOCAL BUILDING/HEALTH CODES SPECIFY A DIFFERENT RATIO.

FINDINGS:

The Hutchins Unit does not maintain a 24 hour Medical Department

Standard #4-4419

OFFENDERS HAVE ACCESS TO TOILETS AND HAND-WASHING FACILITIES 24 HOURS PER DAY AND ARE ABLE TO USE TOILET FACILITIES WITHOUT STAFF ASSISTANCE WHEN THEY ARE CONFINED IN THE MEDICAL HOUSING UNIT OR IN THE INFIRMARY AREA. TOILETS ARE PROVIDED AT A MINIMUM RATIO OF ONE FOR EVERY 12 OFFENDERS IN MALE FACILITIES

AND ONE FOR EVERY 8 OFFENDERS IN FEMALE FACILITIES. URINALS MAY BE SUBSTITUTED FOR UP TO ONE-HALF OF THE TOILETS IN MALE FACILITIES. ALL HOUSING UNITS WITH THREE OR MORE OFFENDERS HAVE A MINIMUM OF TWO TOILETS. THESE RATIOS APPLY UNLESS STATE OR LOCAL BUILDING OR HEALTH CODES SPECIFY A DIFFERENT RATIO.

FINDINGS:

The Hutchins Unit does not maintain a 24 hour Medical Department

Standard #4-4436

WRITTEN POLICY, PROCEDURE, AND PRACTICE REQUIRE THAT COMPREHENSIVE COUNSELING AND ASSISTANCE ARE PROVIDED TO PREGNANT INMATES IN KEEPING WITH THEIR EXPRESSED DESIRES IN PLANNING FOR THEIR UNBORN CHILDREN.

FINDINGS:

The Hutchins Unit is an adult male unit and does not house female offenders

Standard #4-4438

WHERE A DRUG TREATMENT PROGRAM EXISTS, WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT THE ALCOHOL AND DRUG ABUSE TREATMENT PROGRAM HAS A WRITTEN TREATMENT PHILOSOPHY WITHIN THE CONTEXT OF THE TOTAL CORRECTIONS SYSTEM, AS WELL AS GOALS AND MEASURABLE OBJECTIVES.

FINDINGS:

The Hutchins Unit is not a Therapeutic Community

Standard #4-4439

WHERE A DRUG TREATMENT PROGRAM EXISTS, WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE FOR AN APPROPRIATE RANGE OF PRIMARY TREATMENT SERVICES FOR ALCOHOL AND OTHER DRUG ABUSING INMATES THAT INCLUDE, AT A MINIMUM, THE FOLLOWING:

- INMATE DIAGNOSIS
- IDENTIFIED PROBLEM AREAS
- INDIVIDUAL TREATMENT OBJECTIVES
- TREATMENT GOALS
- COUNSELING NEEDS
- DRUG EDUCATION PLAN

- RELAPSE PREVENTION AND MANAGEMENT
- CULTURALLY SENSITIVE TREATMENT OBJECTIVES, AS APPROPRIATE
- THE PROVISION OF SELF-HELP GROUPS AS AN ADJUNCT TO TREATMENT
- PRERELEASE AND TRANSITIONAL SERVICE NEEDS
- COORDINATION EFFORTS WITHIN COMMUNITY SUPERVISION AND TREATMENT STAFF DURING THE PRERELEASE PHASE TO ENSURE A CONTINUUM OF SUPERVISION AND TREATMENT

FINDINGS:

The Hutchins Unit is not a Therapeutic Community

Standard #4-4440

WHERE A DRUG AND ALCOHOL TREATMENT PROGRAM EXISTS, WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT THE FACILITY USES A COORDINATED STAFF APPROACH TO DELIVER TREATMENT SERVICES. THIS APPROACH TO SERVICE DELIVERY SHALL BE DOCUMENTED IN TREATMENT PLANNING CONFERENCES AND INDIVIDUAL TREATMENT FILES.

FINDINGS:

The Hutchins Unit is not a Therapeutic Community

Standard #4-4441

WHERE A DRUG AND ALCOHOL TREATMENT PROGRAM EXISTS, WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE INCENTIVES FOR TARGETED TREATMENT PROGRAMS TO INCREASE AND MAINTAIN THE INMATE'S MOTIVATION FOR TREATMENT.

FINDINGS:

The Hutchins Unit is not a Therapeutic Community

Standard #4-4443

TEMPORARY RELEASE PROGRAMS SHOULD INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:

- WRITTEN OPERATIONAL PROCEDURES
- CAREFUL SCREENING AND SELECTION PROCEDURES
- WRITTEN RULES OF CONDUCT AND SANCTIONS

- A SYSTEM OF SUPERVISION TO MINIMIZE INMATE ABUSE OF PROGRAM PRIVILEGES
- A COMPLETE RECORDKEEPING SYSTEM
- A SYSTEM FOR EVALUATING PROGRAM EFFECTIVENESS
- EFFORTS TO OBTAIN COMMUNITY COOPERATION AND SUPPORT

FINDINGS:

TDCJ does not have a Temporary Release Program

Standard #4-4457

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT THE SECURITY AND PROGRAM DETERMINATIONS NECESSARY FOR ANY INDIVIDUAL TO BE ELIGIBLE FOR INDUSTRIES WORK ARE MADE BY THE CLASSIFICATION COMMITTEE.

FINDINGS:

The Hutchins Unit does not have an Industry Program

Standard #4-4458

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT THE NUMBER OF INMATES ASSIGNED TO INDUSTRIES OPERATIONS MEET THE REALISTIC WORKLOAD NEEDS OF EACH INDUSTRIES OPERATING UNIT.

FINDINGS:

The Hutchins Unit does not have an Industry Program

Standard #4-4459

EACH INDUSTRIES OPERATING UNIT HAS A WRITTEN QUALITY CONTROL PROCEDURE THAT PROVIDES FOR RAW MATERIAL, IN-PROCESS, AND FINAL PRODUCT INSPECTION.

FINDINGS:

The Hutchins Unit does not have an Industry Program

Standard #4-4462

PRIVATE INDUSTRIES ON THE INSTITUTION GROUNDS EMPLOYING INMATES IN POSITIONS NORMALLY FILLED BY PRIVATE CITIZENS PAY

INMATES THE PREVAILING WAGE RATE FOR THE POSITION OCCUPIED.

FINDINGS:

The Hutchins Unit does not have a Prison Enhancement Program

Standard #4-4502

WRITTEN POLICY, PROCEDURE, AND PRACTICE PROVIDE THAT INMATES WITH APPROPRIATE SECURITY CLASSIFICATIONS ARE ALLOWED FURLOUGHS TO THE COMMUNITY TO MAINTAIN COMMUNITY AND FAMILY TIES, SEEK EMPLOYMENT OPPORTUNITIES, AND FOR OTHER PURPOSES CONSISTENT WITH THE PUBLIC INTEREST.

FINDINGS:

TDCJ does not have a program that allows furloughs into the Community

Significant Incident Summary

This summary is required to be provided to the chair of your audit team upon their arrival. The information contained on this form will also be summarized in the narrative portion of the visiting committee report and will be incorporated into the final report. It should contain data for the last 12 months; indicate those months in the boxes provided. Please type the data. If you have questions on how to complete the form, please contact your regional manager.

Facility Hutchins

Year 2009

		Months											
Incidents		Nov 08	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	Jun 09	Jul 09	Aug 09	Sep 09	Oct 09
Assault: Offenders/ Offenders*	Indicate types (sexual**, physical, etc.)	N/A	PHY	PHY	PHY	PHY	PHY	PHY	PHY	PHY	PHY	PHY	PHY
	# With Weapon	0	0	0	0	2	0	2	0	0	0	0	1
	# Without Weapon	0	1	3	1	3	2	2	2	2	2	3	1
ssault: Offender/ Staff	Indicate types (sexual**, physical, etc.)	N/A	N/A	N/A	N/A	PHY	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	# With Weapon	0	0	0	0	1	0	0	0	0	0	0	0
	# Without Weapon	0	0	0	0	0	0	0	0	0	0	0	0
Number of Forced Moves Used***	(Cell extraction or other forced relocation of offenders)	0	0	0	0	0	0	0	0	0	0	0	0
Disturbances****		0	0	0	0	0	0	0	0	0	0	0	0
Number of Times Chemical Agents Used		0	1	2	1	0	1	4	1	0	2	0	1
Number of Times Special Reaction Team Used		0	0	0	0	0	0	0	0	0	0	0	0
Four/Five Point Restraints	Number	0	0	0	0	0	0	0	0	0	0	0	0
	Indicate type (chair, bed, board, etc.)	0	0	0	0	0	0	0	0	0	0	0	0
Offender Medical Referrals as a Result of Injuries Sustained	#'s should reflect incidents on this form, not rec or other source	1	3	7	1	6	2	3	2	3	3	3	4
Escapes	# Attempted	0	0	0	0	0	0	0	0	0	0	0	0
	# Actual	0	0	0	0	0	0	0	0	0	0	0	0
Substantiated Grievances (resolved in favor of offender)	Reason (medical, food, religious, etc.)	See	Attach ment										
	Number	See	Attach ment										
Deaths	Reason (violent, illness, suicide	NAT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Number	1	0	0	0	0	0	0	0	0	0	0	0

*Any physical contact that involves two or more offenders
**Oral, anal or vaginal copulation involving at least two parties
***Routine transportation of offenders is not considered "forced"
****Any incident that involves four or more offenders. Includes gang fights, organized multiple hunger strikes, work stoppages, hostage situation major fires, or other large scale incidents

		Health Care Outcomes		
Standard	Outcome Measure	Numerator/Denominator	Value	Calculated O.M.
1A	(1)	Number of offenders diagnosed with a MRSA infection within the past twelve (12) months	109	
	divided by	The average daily population	1968	5.54%
	(2)	Number of offenders diagnosed with active tuberculosis in the past twelve (12) months	1	
	divided by	Average daily population.	109	0.92%
	(3)	Number of offenders who are new converters on a TB test that indicates newly acquired TB infection in the past twelve (12) months	18	
	divided by	Number of offenders administered tests for TB infection in the past twelve (12) months as part of periodic or clinically-based testing, but not intake screening.	83	21.69%
	(4)	Number of offenders who completed treatment for latent tuberculosis infection in the past twelve (12) months	23	
	divided by	Number of offenders treated for latent tuberculosis infection in the past twelve (12) months.	112	20.54%
	(5)	Number of offenders diagnosed with Hepatitis C viral infection at a given point in time	180	
	divided by	Total offender population at that time.	1927	9.34%
	(6)	Number of offenders diagnosed with HIV infection at a given point in time	34	
	divided by	Total offender population at that time.	1927	1.76%
	(7)	Number of offenders with HIV infection who are being treated with highly active antiretroviral treatment (HAART) at a given point in time	14	
	divided by	Total number of offenders diagnosed with HIV infection at that time.	34	41.18%
	(8)	Number of selected offenders with HIV infection at a given point in time who have been on antiretroviral therapy for at least six months with a viral load of less than 50 cps/ml	2	
	divided by	Total number of treated offenders with HIV infection that were reviewed.	34	5.88%
	(9)	Number of offenders diagnosed with an Axis I disorder (excluding sole diagnosis of substance abuse) at a given point in time	136	

	divided by	Total offender population at that time.	1927	7.06%
	(10)	Number of offender admissions to off-site hospitals in the past twelve (12) months	16	
	divided by	Average daily population.	1968	0.81%
	(11)	Number of offenders transported off-site for treatment of emergency health conditions in the past twelve (12) months	122	
	divided by	Average daily population in the past twelve (12) months.	1968	6.20%
	(12)	Number of offender specialty consults completed during the past twelve (12) months	236	
	divided by	Number of specialty consults (on-site or off-site) ordered by primary health care practitioners in the past twelve (12) months.	313	75.40%
	(13)	Number of selected hypertensive offenders at a given point in time with a B/P reading > 140 mmHg/ >90 mm Hg	99	
	divided by	Total number of offenders with hypertension who were reviewed.	226	43.81%
	(14)	Number of selected diabetic offenders at a given point in time who are under treatment for at least six months with a hemoglobin A1C level measuring greater than 9 percent	0	
	divided by	Total number of diabetic offenders who were reviewed.	57	0.00%
	(15)	The number of completed dental treatment plans within the past twelve (12) months	136	
	divided by	the average daily population during the reporting period.	1968	6.91%
2A	(1)	Number of health care staff with lapsed licensure or certification during a twelve (12) month period	0	
	divided by	Number of licensed or certified staff during a twelve (12) month period.	25	0.00%
	(2)	Number of new health care staff during a twelve (12) month period that completed orientation training prior to undertaking their job	7	
	divided by	Number of new health care staff during the twelve (12) month period.	7	100.00%
	(3)	Number of occupational exposures to blood or other potentially infectious materials in the past twelve (12) months	2	
	divided by	Number of employees.	33	6.05%
	(4)	Number of direct care staff (employees and contractors) with a conversion of a TB test that indicates newly acquired TB infection in the past twelve (12) months	0	
	divided by	Number of direct care staff tested for TB infection in the past twelve (12) months during periodic or clinically indicated evaluations.	2	0.00%
3A	(1)	Number of offender grievances related to health care services found in favor of the offender in the past twelve (12) months	15	
	divided by	Number of evaluated offender grievances related to health care services in the past twelve (12) months.	71	21.13%

	(2)	Number of offender grievances related to safety or sanitation sustained during a twelve (12) month period	4	
	divided by	Number of evaluated offender grievances related to safety or sanitation during a twelve (12) month period.	14	28.57%
	(3)	Number of adjudicated offender lawsuits related to the delivery of health care found in favor of the offender in the past twelve (12) months	0	
	divided by	Number of offender adjudicated lawsuits related to healthcare delivery in the past twelve (12) months	0	#DIV/O1
4A	(1)	Number of problems identified by quality assurance program that were corrected during a twelve (12) month period	5	
	divided by	Number of problems identified by quality assurance program during a twelve (12) month period.	4	125.00%
	(2)	Number of high-risk events or adverse outcomes identified by the quality assurance program during a twelve (12) month period.	0	
	(3)	Number of offender suicide attempts in the past twelve (12) months	1	
	divided by	Average daily population	1968	0.05%
	(4)	Number of offender suicides in the past twelve (12) months	0	
	divided by	Average daily population	1968	0.00%
	(5)	Number of unexpected natural deaths in the past twelve (12) months	1	
	divided by	Total number of deaths in the same reporting period.	1	
	(6)	Number of serious medication errors in the past twelve (12) months	0	
5A	None			
6A	None			
7A	None			
7B	None			
7C	None			

From: Tina Carmona/Institutional/TDCJ
To: Carol Cozart/Institutional/TDCJ

Date: Wednesday, May 12, 2010 10:17AM
Subject: Fw: ACA Final Report

Please print this and all attachments. Be sure to give copy to ACA for files.

Russell Bailey

----- Original Message -----
From: Russell Bailey
Sent: 05/12/2010 10:16 AM CDT
To: Tina Carmona
Cc: pamager@utmb.edu
Subject: ACA Final Report

Warden Carmona,
Attached below is the ACA Final Report for the Hutchins Unit. We no longer mail out a hard copy, so please print the report, and ensure that a copy is maintained in the ACA Office. The Panel Hearing Minutes are located on page 28. Again, congratulations to you and your staff on your Reaccreditation.

Russell Bailey, Administrator
TDCJ Monitoring & Standards

Attachments:

Hutchins Unit Final Report.pdf

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

STEPHEN MCCOLLUM, *et al.*,	§	
Plaintiffs,	§	
	§	
v.	§	**CIVIL NO. 4:14-CV-3253**
	§	
	§	
BRAD LIVINGSTON, *et al.*,	§	
***Defendants*.**	§	
	§	

Exhibit 37

AFFIDAVIT OF JOHN NIELSEN-GAMMON

STATE OF TEXAS §
§
COUNTY OF BRAZOS §

Before me, the undersigned authority, personally appeared John Nielsen-Gammon, who, being by me duly sworn, deposed as follows:

"My name is John Nielsen-Gammon. I am over 21 years of age, of sound mind, capable of making this affidavit, and personally acquainted with the facts as stated herein. I am currently employed as Regents Professor of Atmospheric Sciences at Texas A&M University, where I have been employed as a faculty member since 1991. As such, I teach courses ranging from introductory seminar courses to advanced graduate-level courses. I am also the Texas State Climatologist, having been appointed to that position by then-Governor George W. Bush in 2000.

My research activities are wide-ranging and include weather analysis and forecasting, air pollution meteorology, and applied climatology. The latter topic involves using climatological knowledge to solve real-world climate-related problems. I have authored or co-authored over fifty peer-reviewed articles, ten book chapters, various reports and preprints, and roughly 150 blog entries on weather and climate topics. I give about forty invited talks a year across the state of Texas on climate-related issues. My research has been funded by over fifty external grants and contracts. I have served as chair of the American Meteorological Society's Board on Higher Education and as president of the International Commission for Dynamical Meteorology. I have served on several National Research Council committees. I am a Fellow of the American Meteorological Society."

The body seeks to regulate its core temperature within normal bounds. For a given body, the success or failure of this regulation depends on six primary factors. The four extrinsic factors are temperature, humidity, radiation (sunlight or thermal radiation), and wind. The two intrinsic factors are clothing and physical activity. As a climatologist, I can attest to specific temperatures and records of the forecasts made during any specific past time and period in any given area in Texas, including, but not limited to the area where the Hutchins Unit of TDCJ is located.

The aviation network of weather stations records hourly or more frequent observations of many meteorological variables, including temperature, air pressure, and dew point. This network exists primarily in support of aircraft operations, so these stations are located at airports with frequent air traffic.

If weather information for a particular day or month must be estimated at a site without observations, the observing site should be as close as possible to the site of interest and be similarly situated within the local topography. Trends over multiple years or decades tend to be much more smoothly varying from location to location, and it is desirable to estimate trends from a large number of observations in the same region so as to avoid issues such as change in instrumentation, change in location, or change in observing practice that might contaminate an individual data record. Also, averaging over a larger area reduces, but does not eliminate, the influence of random, localized weather variations that can temporarily affect any long-term trend.

As the state climatologist, I am aware that the nearest station to the Hutchins Unit, Lancaster, 9 km away, has a short period of record. Dallas Executive Airport, 15 km away, has a longer period of record, and Dallas Love Field and Dallas-Fort Worth International Airport have long periods of record. When we analyze temperature data, as climatologists, we would review temperatures nearest the actual data site. All listed stations are at a higher altitude than the Hutchins Unit, so for that factor they should slightly underestimate maximum temperature and overestimate minimum temperature. However, for the Hutchins unit, an additional important factor is the urban heat island in the DFW metroplex. Stations located closer to the center of major cities should tend to read anomalously warm during both day and night. Relative to the urban heat island, Lancaster is farther away while the other stations are closer, with Dallas Love Field near the core of the Dallas urban heat island. To avoid the strongest heat island influences, the stations that represent the Hutchins Unit will be Lancaster, Dallas Executive (also known as Dallas Redbird), and Dallas-Fort Worth International.

During periods of high temperatures, the body's primary mechanism for cooling is generally evaporation of sweat. The rate of evaporation depends most strongly on the extent to which the air

is dry or wet. Thus many indices seek to combine the impacts of temperature and humidity into a single number. One such index, now quite common in the United States, is the Heat Index (HI). Another such index is the wet-bulb globe temperature, or WBGT. This index is designed to be a measurable quantity that takes into account not just thermal conduction and evaporation, but also radiant heat transfer.

In applied climatology, the extent to which daily and extended heat events are historically common or unusual are tracked using exceedances. Given a certain heat threshold, the number of exceedances is the number of days or hours in which the observed value exceeded that threshold. I make no assumptions concerning the threshold beyond which adverse health impacts occur in prisons. I am using fixed thresholds for hourly WBGT exceedances, while daily exceedance thresholds are location-specific so as to provide at least ten exceedances during at least one year. In general, the overall number of exceedances are very sensitive to the threshold, while the variations in exceedances over time are not very sensitive to the threshold.

In the part of Texas that includes the Hutchins Unit, the heat of 2011 was remarkably unusual. At all stations considered, the number of maximum temperature exceedances in 2011 was much greater than in any other year with exceedance data considered. Minimum temperatures were also unusual, though not quite so extreme as maximum temperatures. As with maximum temperatures, every station recorded its greatest number of exceedances in 2011.

Unlike temperature exceedances, the year 2011 was not an exceptional year for large numbers of daily maximum heat index exceedances in the part of Texas that includes the Hutchins Unit. While there were an unusually large number of very high temperature days, those days must have featured low humidity because the number of days with high values of the maximum HI was similar to that of several other years. Nighttime HIs, however, were unusually high. All stations considered most representative for the Hutchins Unit reported their highest number of nighttime HI exceedances in 2011 compared to all other years considered. For example, Dallas Redbird (Dallas Executive Airport) recorded 23 days in 2011 in which the HI failed to drop below 85 F, and just 22 such days in all other years between 2006 and 2014.

At none of the weather stations where WBGT was estimated did the WBGT exceed the reference values for resting individuals, whether acclimatized or not. According to standards published by the International Organization of Standardization, for working conditions in the area of Texas including the Hutchins Unit, the number of 84.2 F exceedance hours had two periods of elevated frequency: 1995-2000 and 2010-2011. Depending on the station, there were roughly 100 hours with the WBGT above 84.2 F. The 86 F exceedances show the same two periods of elevated frequency in the area, though this threshold is achieved more rarely: between 0 and 16 hours in 2011.

The maximum HI at Lancaster was at or above 100 F on all but two days during July and August of 2011, and the maximum high temperature was at or above 100 F on most days during those months. The high temperatures were above normal on all but one to three days, peaking at over ten degrees above normal in early August. The daily average WBGT reached its maximum value of 80 F during the same early August period, and minimum HI values were frequently at or above 80 F.

The National Weather Service seasonal outlooks are issued by the Climate Prediction Center. They are framed as probabilities of actual temperatures averaged across an area falling within a certain category of historical temperatures.

For outlooks at issue here, the historical categories are defined as follows. For example, consider an outlook for the upcoming June through August period. The reference period is a 30 year historical period. The average temperatures for each of the June-August periods in a given climate superdivision are divided into thirds. The highest third is designated A, for "above normal". The middle third is designated N, for "near normal". The lowest third is designated B, for "below normal". If the cutoff between categories A and N is 74.5 F, then the "A" probability is the probability that the actual average June-August temperature will be at least 74.5 F.

Outlooks covering overlapping three-month periods are issued by the Climate Prediction Center near the middle of each month. The April outlook was issued on April 21, 2011. The outlooks issued in April for the periods June-August 2011 and July-September 2011 had northeast and

north-central Texas within the white zone, which means "equal chances". This means that the forecasters judged that there was a 1/3 chance of the three-month periods having temperatures comparable to the coldest third of years within the reference period (in this case, 1971-2000), a 1/3 chance of temperatures comparable to the middle third, and a 1/3 chance of temperatures comparable to the warmest third. In other words, this outlook said that for north-central and northeast Texas, there was no particular reason to expect anything out of the ordinary. From the perspective of April 2011, a record-shattering summer in that part of the state would have been quite unexpected.

In May 2011 the Climate Prediction Center switched from a 1971-2000 reference period to a 1981-2010 reference period. The final outlook for June-August average temperatures was issued on May 19. In north-central Texas, the "A" probability was between 33% and 40%. This means that the probability was less than half that seasonal average temperatures will exceed the "A" cutoff. In that area, the "A" cutoff is 0.5 F above normal. Stated plainly, the official outlook in mid-May was for the summer to most likely be a few tenths of a degree above normal. In reality, the June-August 2011 period was 6.8 F above normal in north-central Texas.

Single-month outlooks are issued near the middle of the previous month and updated at the end of the previous month. The end of June outlook for July 2011 was for an approximately 45% chance of the "A" category in north-central Texas (Figure 16). In other words, the odds of the average temperature in the region being above 84.0 F was not even 50-50. In reality, July 2011 averaged 89.7 F across the region, breaking the previous record for July by a full degree.

A sample 8-14 day outlook for late July 2011 has an approximately 55% chance of the "A" category throughout Texas. In other words, the odds of the average temperature in the region being among the ten warmest late July weeks out of the previous 30 was barely better than 50-50. Even this close to late July, there was little indication at that lead of the exceptional nature of the actual temperatures.

Portions of the summer of 2011 satisfied the criteria for heat advisories or excessive heat warnings. Such advisories or warnings would be posted a day or two in advance if an event is well forecasted

or might be posted without any lead time if an event is not well forecasted.

Large-scale measures of 2011 heat severity are available from the National Centers for Environmental Information's Climate Division data set. Table 1 gives an overall ranking of the warmer maximum temperature values averaged across July and August for all years between 1895 and 2014 in the north-central Texas climate division, which includes the area of the Hutchins Unit.

July-August 2011 was a true record-setter. In the North-Central climate division, the gap between 2011 and the second warmest year is as large as the gap between the second warmest year and the twentieth warmest year.

A recent paper considered the odds of such widespread, extreme heat across Texas, given the historical information available through 2010.[1] The June-August average temperature across the region was 5.2 F above the long-term average, and the previous warmest June-August was only 2.9 F above the long-term average. Based on a simple statistical analysis and assuming a normal distribution to the data, the chance of having a summer as warm as 2011 (slightly more than 4 sigmas, in statistical terms) in an unchanging climate was roughly 1 in 60,000.

The same paper also considered the role that climate change had played in changing the odds. Based on computer model simulations and comparisons with data, by 2011 climate change had caused Texas summertime temperatures to have increased by 1.1 F relative to the long-term average. With summer 2011 being only 4.1 F above what would be expected from climate change, the odds of the actual summer 2011 event become roughly 1 in 1300. Put another way, no matter how much climate change causes overall temperatures to warm, according to the study, the chances of having another Texas summer 4.1 F warmer than the preceding 30 year average sometime in the next thousand years is less than fifty-fifty.

Further affiant sayeth not."

[1] Hoerling, Martin, Arun Kumar, Randall Dole, John W. Nielsen-Gammon, Jon Eischeid, Judith Perlwitz, Xiao-Wei Quan, Tao Zhang, Philip Pegion, and Mingyue Chen, 2013: Anatomy of an Extreme Event. Journal of Climate, 26, 2811-2832, doi:10.1175/JCLI-D-12-00270.1.

JOHN NIELSEN-GAMMON, PH.D.
Regents Professor of Atmospheric Sciences at Texas A&M University and Texas State Climatologist

SWORN AND SUBSCRIBED BEFORE ME, by the said John Nielsen-Gammon, on this the 23 day of May, 2016, to certify which witness my hand and seal of office.

Michelle Soto

Notary Public in and for

The State of Texas

My Commission Expires: ____________________

MICHELLE SOTO
Notary Public
STATE OF TEXAS
Commission Exp. SEPT. 24, 2018
Notary without Bond

Year	North-Central	Year	South-Central	Year	East
2011	103.15	2011	100.6	2011	101.35
1934	100.5	2009	99.65	1954	99.05
1954	100.3	1951	99	1951	98.5
1980	99.95	1962	98.4	1998	98.45
1956	99.9	1917	98.35	1980	98.35
1918	99.3	1918	98.35	1956	98.1
1951	99.25	2000	98.3	1934	98
1952	98.95	1954	98.1	2000	97.45
1943	98.95	1899	97.9	1925	96.85
2000	98.8	1896	97.8	1969	96.85
1998	98.7	1925	97.75	1924	96.8
1910	98.45	1957	97.65	1930	96.75
1930	98.3	1956	97.5	1909	96.7
1913	98.25	1910	97.4	1962	96.65
2006	98.25	1901	97.35	1948	96.6
1963	98.15	1982	97.3	1896	96.5
1901	98.1	1948	97.3	1978	96.45
1909	98	1928	97.25	1939	96.35
1925	97.85	1998	97.25	1913	96.15
1964	97.85	1912	97.2	1918	96
1936	97.75	1980	97.2	1963	96
1957	97.7	1969	97.15	1932	95.95
1922	97.5	1937	97.1	1944	95.75
1923	97.5	1897	97.05	1964	95.75
1939	97.5	1922	96.95	1917	95.7

Table 1: Ranking of the 25 hottest summers since the beginning of climate division data in 1895 for Texas climate divisions 3 (North-Central), 7 (South-Central), and 4 (East). Temperature values are average daily maximum temperatures in degrees Fahrenheit for July-August.

Anatomy of an Extreme Event

MARTIN HOERLING,* ARUN KUMAR,+ RANDALL DOLE,* JOHN W. NIELSEN-GAMMON,#
JON EISCHEID,@ JUDITH PERLWITZ,@ XIAO-WEI QUAN,@ TAO ZHANG,@
PHILIP PEGION,@ AND MINGYUE CHEN+

* *NOAA/Earth System Research Laboratory, Boulder, Colorado*
\+ *NOAA/Climate Prediction Center, Camp Springs, Maryland*
\# *Department of Atmospheric Sciences, Texas A&M University, College Station, Texas*
@ *NOAA/Earth System Research Laboratory, and University of Colorado, Cooperative Institute for Research in Environmental Sciences, Boulder, Colorado*

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ABSTRACT

The record-setting 2011 Texas drought/heat wave is examined to identify physical processes, underlying causes, and predictability. October 2010–September 2011 was Texas's driest 12-month period on record. While the summer 2011 heat wave magnitude (2.9°C above the 1981–2010 mean) was larger than the previous record, events of similar or larger magnitude appear in preindustrial control runs of climate models. The principal factor contributing to the heat wave magnitude was a severe rainfall deficit during antecedent and concurrent seasons related to anomalous sea surface temperatures (SSTs) that included a La Niña event. Virtually all the precipitation deficits appear to be due to natural variability. About 0.6°C warming relative to the 1981–2010 mean is estimated to be attributable to human-induced climate change, with warming observed mainly in the past decade. Quantitative attribution of the overall human-induced contribution since preindustrial times is complicated by the lack of a detected century-scale temperature trend over Texas. Multiple factors altered the probability of climate extremes over Texas in 2011. Observed SST conditions increased the frequency of severe rainfall deficit events from 9% to 34% relative to 1981–2010, while anthropogenic forcing did not appreciably alter their frequency. Human-induced climate change increased the probability of a new temperature record from 3% during the 1981–2010 reference period to 6% in 2011, while the 2011 SSTs increased the probability from 4% to 23%. Forecasts initialized in May 2011 demonstrate predictive skill in anticipating much of the SST-enhanced risk for an extreme summer drought/heat wave over Texas.

1. Introduction

Drought and heat are no strangers to Texas. According to climate division data from the National Climatic Data Center (NCDC; Guttman and Quayle 1996), the average summertime [June–August (JJA)] temperature is higher in Texas than in any other of the lower 48 states. Memorable Texas summertime heat waves include 1934 during the Dust Bowl, the 1980 central United States heat wave with 107 heat-related deaths reported in Texas (Greenberg et al. 1983), and the more localized Texas–Oklahoma heat wave in 1998 (Hong and Kalnay 2002). The drought of 1948–57 is the drought of record across most of Texas, and the statewide Palmer Drought Severity Index (PDSI) achieved a minimum of −7.80 in September 1956. Other memorable droughts and their associated minimum PDSI values were in 1916–18 (−7.09) and 1925 (−6.10).

And then came 2011. The three-month average for June through August was 30.4°C, warmer than any previous single month. This was 2.9°C above the long-term average, nearly a factor of 2 larger than the previous record June–August departure. The heat was accompanied by extreme drought: statewide precipitation for October 2010 through September 2011 was 287 mm, a new record for driest consecutive 12 months. The PDSI reached a new record minimum of −7.93 in September 2011. Along with the drought and heat came record statewide agricultural losses of $7.62 billion (all values are in U.S. dollars) (Fannin 2012). Wildfires burned 3 993 716 acres, almost double the previous highest value in 20 years of statewide records, according

Corresponding author address: M. Hoerling, NOAA/Earth System Research Laboratory, 325 Broadway, Boulder CO 80305.
E-mail: martin.hoerling@noaa.gov

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to the Texas Forest Service. Commercial timber losses from the drought totaled $755 million, of which only 13% was due to wildfire (Texas Forest Service 2012).

This paper examines the climatological context for both the extreme precipitation and temperature conditions occurring over Texas during 2011, diagnoses the physical processes contributing to both conditions including their interrelationship and feedbacks, and examines underlying causes with a principal purpose of providing a predictive understanding (i.e., quantifying the predictability). The paper assesses how various contributing factors affected event occurrence, including its timing and location, but especially its magnitude and probability for record threshold exceedance, comparing the role of natural factors to those associated with human-induced climate change. In addition to the analysis of observational data, the paper diagnoses initialized coupled forecasts that were part of the National Oceanic and Atmospheric Administration's (NOAA's) operational seasonal forecasting activities, and uninitialized climate simulations of phase 5 of the Coupled Model Intercomparison Project (CMIP5).

Several specific questions are considered in this study of the 2011 Texas drought and heat wave. What processes, whether due to natural variability or anthropogenic climate change, might have provided early warning? Were, for instance, interannually varying sea surface temperatures (SSTs) important, as for the 1998 heat wave (e.g., Hong and Kalnay 2000), and to which the 1930s and 1950s central U.S. warm/dry epochs were also sensitive (Schubert et al. 2004a,b; Seager et al. 2005; Hoerling et al. 2009)? Did soil moisture play an appreciable role in this event, given that the Great Plains is a region of known strong land surface feedbacks on summertime air temperature and rainfall (e.g., Koster et al. 2004, 2010) and case studies provide evidence for appreciable soil moisture effects in 1980 and 1998 and during the Dust Bowl (e.g., Hong and Kalnay 2002; Lyon and Dole 1995; Schubert et al. 2004a,b)? How did the antecedent deficits in precipitation, which themselves were record setting, influence the subsequent summer Texas heat wave intensity in light of global observational analyses indicating that hot summer days are much more likely after the occurrence of precipitation deficits (Mueller and Seneviratne 2012)? Finally, what aspects of the drought/heat wave were manifestations of human-induced climate change?

Presented herein is a considerably broader assessment of the causes for the extreme Texas conditions than would be entailed by an attribution of human-induced climate change alone. Likewise, the study is concerned not just with how various factors, including anthropogenic climate change, may have altered the probability of exceeding a particular extreme threshold for rainfall and temperature over Texas in 2011, but also with explaining the full magnitude of the drought and heat wave intensities.

Statistical analyses of the relationships between climate change and general classes of events may provide some gross insights on the Texas drought/heat wave event, but there are significant uncertainties. For instance, warm extremes have increased more rapidly in recent decades compared to cold extremes over the United States as a whole (Meehl et al. 2009), and a recent synthesis report expresses medium confidence that heat waves have lengthened and become more frequent over many regions as a result of anthropogenic climate change (Field et al. 2012). Yet, no systematic changes in the annual and warm season mean daily temperature have been detected over the Great Plains and Texas over the 62-yr period from 1948 to 2009 (Groisman et al. 2012), consistent with the notion of a regional "warming hole" (e.g., Kunkel et al. 2006). Indeed, May–October maximum temperatures over the region have decreased by 0.9°C $(62\ \mathrm{yr})^{-1}$, which is statistically significant according to Groisman et al. The authors surmise that "It may well be that the maximum temperature decrease was caused by wetter warm seasons in the last decades rather than an opposite inference." Their assessment of an increase in regional summertime rainfall is consistent with results of a century-scale analysis that also shows significant increases in precipitation (McRoberts and Nielsen-Gammon 2011), and with the Intergovernmental Panel on Climate Change (IPCC) report on extremes (Field et al. 2012) that notes droughts have become less frequent, less intense, and shorter in duration since about 1950 over central North America.

It is therefore evident that neither the 2011 record drought nor record heat wave was consistent with recent regional trends over Texas, complicating the quantification of overall human-induced climate change contribution. Thus, a comprehensive event-specific diagnosis, including assessing its climatological context in both a regional and global framework, is essential for a proper understanding of this extreme event.

The paper presents a quantitative analysis into the anatomy of the 2011 Texas heat wave and drought, undertaken in the spirit of Namias's (1982) dissection of the 1980 event. Section 2 describes the observational and numerical model datasets.

Section 3 probes into potential causes for the climate extremes including an assessment of the range of extremes that could arise solely from natural variations and a quantification of the likely roles of both natural and human influences on the drought and heat wave. The paper contrasts the ability of uninitialized and initialized climate models in simulating the extreme

TABLE 1. Summary of the climate simulations, predictions, and projections diagnosed in the current paper, including the nature of their external and boundary forcings, the length of integrations, and the available ensemble size.

Type	Model	Radiative forcing	SST, sea ice	Duration (target time)	Ensemble members
Preindustrial simulation	CMIP5	Preindustrial	Coupled	≥500 yr	1 run each for 18 models
Historical simulation	GFSv2	Observed CO_2	Observed (AMIP)	1950–2010	12
Event simulation	GFSv2*	Observed CO_2	Observed (AMIP)	October 2009–September 2011	80
Historical simulation	CMIP5	Observed (see text)	Coupled	1880–2005	1 run each for 20 models
Projection	CMIP5	RCP 4.5 (see text)	Coupled	2006–16	1 run each for 20 models
Forecast (0 lead)	CFSv1	1988 CO_2	Coupled	1 Jun–31 Aug 2011	120 (initialized every 6 h)
Hindcast (0 lead)	CFSv1	1988 CO_2	Coupled	1 Jun–31 Aug 1981–2009	15 (initialized once daily, staggered every 2 days)
Forecast (0 lead)	CFSv2	Observed and projected CO_2	Coupled	1 Jun–31 Aug 2011	120 (initialized every 6 h)
Hindcast (0 lead)	CFSv2	Observed CO_2	Coupled	1 Jun–31 Aug 1982–2010	24 (initialized every 6 h, staggered every 5 days)

* Anomaly calculated relative to a 1981–2010 GFSv2 AMIP set having same CO_2 as the 2011 runs.

conditions over Texas during summer 2011. A summary of results is presented in section 4, which includes a discussion of the possible overall effects of climate change over the period spanning preindustrial times to the present.

2. Data and methods

a. *Observational data*

Contiguous U.S. surface temperature and precipitation for 1895–2011 are derived from NOAA's monthly U.S. Climate Division data (NCDC 2002). Analyses of Texas averaged conditions are constructed by averaging the 10 individual climate divisions available for the state. Global monthly SST data are based on the 1° gridded Hadley Centre Global Sea Ice and Sea Surface Temperature (HadISST) product (Rayner et al. 2003). For both datasets, seasonal departures are calculated relative to a 1981–2010 reference.

b. *Climate model simulations*

Four configurations of climate simulations are studied in order to determine different aspects of the variability in Texas temperature and rainfall. One employs a suite of CMIP5 global coupled ocean–atmosphere models in which external radiative conditions are fixed to preindustrial conditions. We analyze the results from 18 different models having integrations typically on the order of 500 years. A more detailed analysis is conducted of a dataset consisting of 1500 years of simulations based on the fourth version of the Community Climate System Model (CCSM4; Gent et al. 2011). This and other model configurations are summarized in Table 1.

A second configuration employs a global atmospheric model in which SSTs, sea ice, and carbon dioxide concentrations (but no other external forcings) are specified to vary as observed during the period 1950–2010. This uses the atmospheric component [Global Forecast System (GFS)] of the second version of NOAA's Climate Forecast System (CFSv2). Further, in order to assess the statistical properties of the atmospheric response to global SST/sea ice conditions during the period of the Texas heat wave, we examine output from a third additional 80-member ensemble of GFS simulations spanning the period October 2009–September 2011.

The fourth configuration is based on the externally forced CMIP5 simulations. We analyze monthly output from 20 different models that were subjected to variations in greenhouse gases (GHGs), aerosols, solar irradiance, and the radiative effects of volcanic activity for 1880–2005 (Taylor et al. 2012). Our analysis uses single runs from each of the modeling centers.

c. *Climate model projections and predictions*

Projections (uninitialized simulations) of climate conditions during the 2011 Texas heat wave are based on CMIP5 models employing the Representative Concentration Pathway (RCP) 4.5 for individual greenhouse gases and aerosols (Moss et al. 2010). We diagnose the CMIP model runs for an 11-yr centered window (2006–16) in order to consider a large ensemble from which the

model's signal and the intensity of natural internal variability in 2011 can be estimated. The forcing will be subsequently referred to as "anthropogenic forcing" to denote the radiative driving associated with the projected changes in anthropogenic GHGs and aerosols, and the impacts for 2011 will be referred to as "human-induced" climate change.

Predictions (initialized forecasts) of climate conditions are analyzed using the first (CFSv1; Saha et al. 2006) and second (CFSv2) generations of NOAA's Climate Forecast System. Apart from differences in the resolution of the atmospheric and oceanic component models between CFSv1 and CFSv2,[1] another difference is that the CO_2 conditions for the CFSv1 were held fixed at their 1988 values for all hindcasts and real-time forecasts, while CFSv2 has a time-evolving CO_2 concentration. For each system, retrospective forecasts (hindcasts) provide a reference from which forecast anomalies for 2011 are calculated. All predictions are for JJA seasonal means based on initialization from May conditions. Table 1 provides details on the hindcast and forecast procedures.

The monthly temperature and precipitation data from all model simulations, projections, and predictions are interpolated to the 344 NCDC U.S. Climate Division centroids using a simple linear inverse distance technique to facilitate comparison with the observations. Texas averages are calculated as the area–weight of the 10 climate divisions defining the state. Unless stated otherwise, all model and observed anomalies for 2011 conditions are calculated relative to a 1981–2010 reference climatology. There are several reasons for using this 30-yr period. First, the various model and observed datasets have as their common period of evaluation 1981–2010, thus making this the only period for meaningful intercomparison. Second, it is standard practice in climate monitoring to use a 30-yr period as it is long enough to filter out interannual variations, but also short enough to be able to respond to longer climatic trends. Finally, operational practices of seasonal forecasting involve articulating anomalies relative to the most recent 30-yr average. An assessment of observed overall climate trends spanning the longer period of historical data is also presented, and section 4 further discusses estimates of the overall anthropogenic climate change signal in which the period of reference for estimating CMIP5 model simulations for 2011 is the models' preindustrial climate.

[1] The atmospheric component of CFS, the Global Forecast System (GFS), uses a spectral truncation of 62 and 126 waves in version 1 and 2, respectively.

3. Results

The 2011 heat wave was centered over Texas and Oklahoma (Fig. 1, top), and included western portions of Louisiana and Arkansas, southern Kansas, and eastern New Mexico. The Texas summer temperature of 30.4°C in 2011 was an outlier with respect to conditions during 1895–1954 that included the Dust Bowl era and the sustained late 1940s/early 1950s drought period. It was also an outlier relative to the recent epoch of 1955–2010 that includes the era of rapidly increasing atmospheric greenhouse gas concentrations as indicated in the probability distribution functions (PDFs) of summertime temperature (Fig. 1, bottom right). The similarity in statistical properties of Texas summer temperatures between 1895–1954 and 1955–2010 is consistent with the lack of an appreciable summertime warming trend over the southern plains since the beginning of the twentieth century (e.g., Kunkel et al. 2006; Fig. 1, bottom left). The extreme magnitude of the 2011 event thus would not have been anticipated from any appreciable century-scale trend in the historical time series of Texas summer mean temperatures or their variability, similar to the situation that occurred in relation to the 2010 Russian summer heat wave (Dole et al. 2011). Likewise, the severe deficits in precipitation during 2011 would not have been anticipated from century-scale trends, which were actually toward wetter conditions (McRoberts and Nielsen-Gammon 2011).

a. The role of randomness

We address the question of whether an event as extreme as occurred in 2011 might have been anticipated (at least in a statistical sense) if a longer-term record were available. In such a case, relying on a limited observational data record could result in significantly underestimating the probability of an extreme heat wave or, put another way, overestimating how rare such events would be. This is precisely the recipe for a "climate surprise."

We test this possibility by calculating the statistics of 100-yr block maxima for Texas summertime temperatures occurring in the preindustrial simulations of CMIP5. Figure 2 shows the histogram (gray bars) of the 115 hottest summers occurring in consecutive, non-overlapping 100-yr samples. There is substantial variability in the magnitude of 1 in 100-yr summer warm extremes in these simulations, ranging from a low value of +1.2°C departure to a high value of +4°C departure. The observed 2011 event is thus seen to fall well within this distribution, which also brackets the values for the observed 1895–2010 prior record. The fact that 2011 had a heat wave magnitude much greater than occurring in

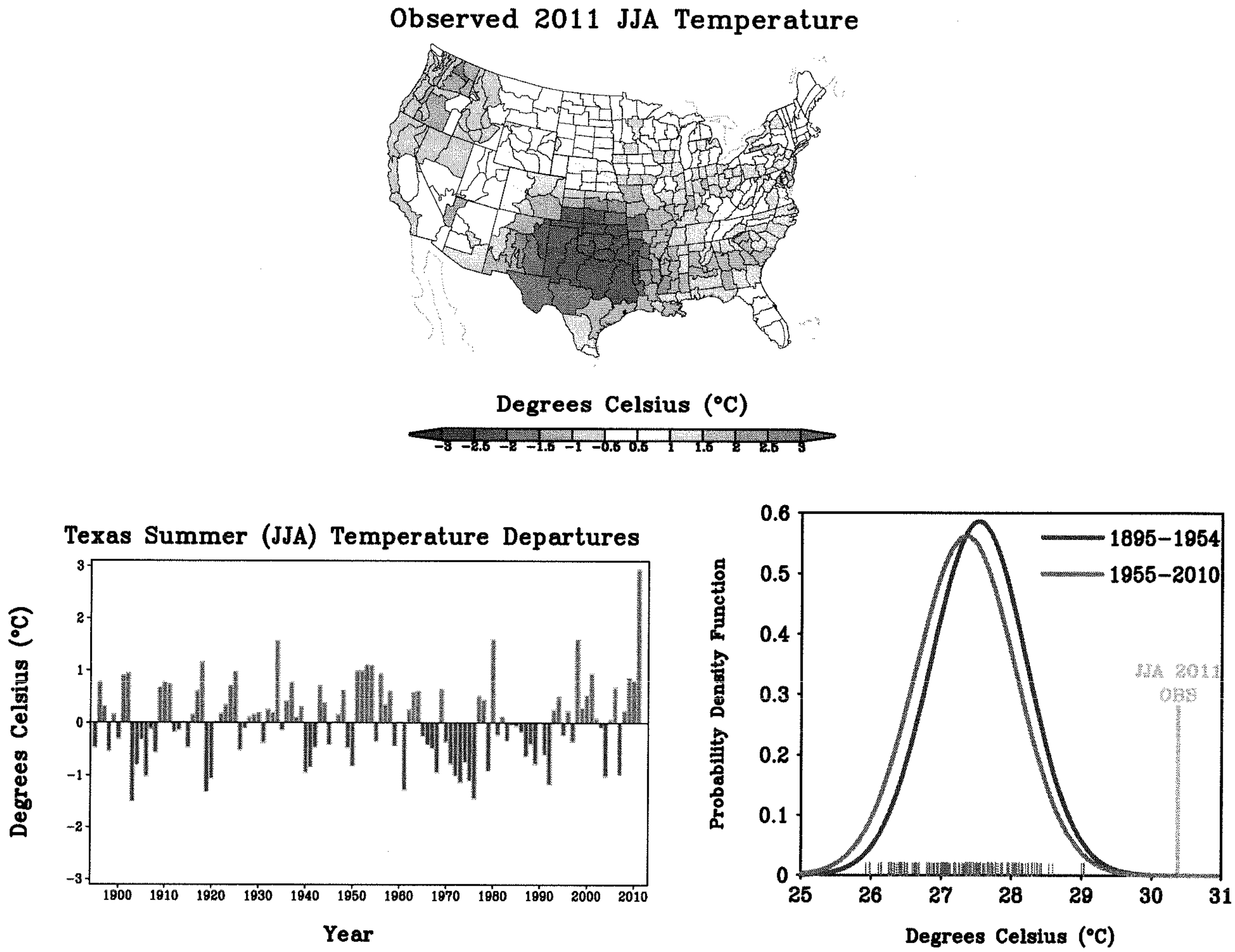

FIG. 1. (top) The observed June–August (JJA) 2011 averaged surface temperature departures (°C), (bottom left) the time series of JJA Texas surface temperature departures (°C), and (bottom right) the PDFs of the JJA Texas surface temperatures for two subperiods of the historical record: 1895–1954 (blue curve), and 1955–2010 (red curve). The observed 2011 JJA Texas surface temperature is shown in gray tick marks. The data source is the NCDC U.S. Climate Divisions, and departures are relative to 1981–2010 means. The PDFs are nonparametric curves constructed using the R software program, which utilizes a kernel density estimation and a Gaussian smoother.

the prior 116-yr observational record could thus be reconciled, at least in part, with the inadequacy of observational data and sampling noise. There are uncertainties, however, in the CMIP5 estimates of such extreme Texas heat wave magnitudes, stemming in part from the fact that individual models have interannual variability of Texas summer temperatures that is appreciably greater than and also some that is appreciably less than observed. The histogram should therefore not be viewed as having been drawn from a homogeneous population. Several individual models having long integrations (on order of 1000 yr) also yield spreads in their 100-yr block maxima heat waves analogous to that shown for the entire multimodel distribution. In particular, a 1500-yr-long simulation of CCSM4 was analyzed separately, in part because of the excellent model representation of climatological mean summer Texas temperatures (27.8°C compared to 27.4°C observed) and the realism of its interannual variability (standard deviation of 0.8°C compared to 0.7°C observed). The range among the 15 samples of CCSM4 block maxima heat waves was +1.5° to +3°C, consistent with the multimodel spread.

The range of 100-yr block maxima extreme event magnitudes is almost certainly greater than indicated by the histogram alone, the latter having been drawn from a finite sample of the models' population. Figure 2 addresses this further by superposing upon the histogram two probability distribution functions, one a fitted Gaussian (red curve) and the other a nonparametric fit. It is evident that the Gaussian curve is not a particularly good fit to these extreme values, consistent with expectations from generalized extreme value theory, although again the fact that the data are not drawn from

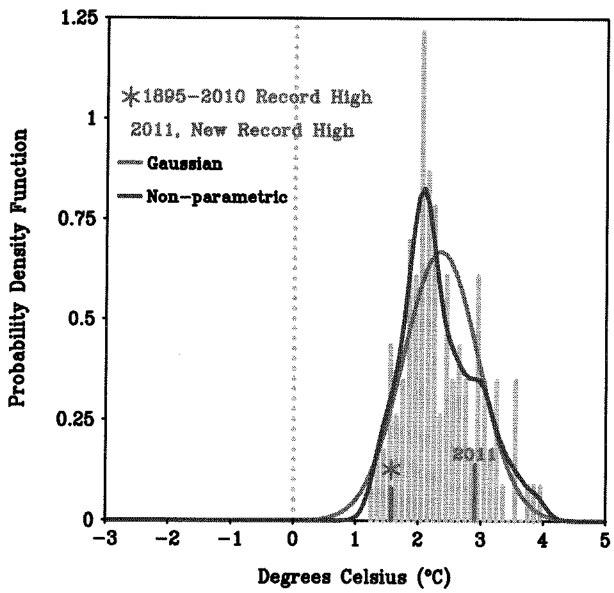

FIG. 2. Histogram of the temperature departures (°C) for the hottest Texas summers occurring in consecutive, nonoverlapping 100-yr samples of CMIP5 preindustrial simulations. The block maxima analysis is based on 18 different CMIP5 models, most of which have at least 500-yr-long simulations. The prior record observed summertime Texas departure during 1895–2010 indicated by short green tick marks, and the 2011 new record summer departure indicated by long green tick marks. The red PDF is the Gaussian fitted curve to the histogram, while the blue PDF is the nonparametric curve constructed using the R software program, which utilizes a kernel density estimation and a Gaussian smoother.

a homogeneous population sample must be recognized also. Whether based on the histogram or the curve fits, the results in Fig. 2 suggest that natural variability alone appears capable of producing heat wave magnitudes as large as (or larger than) observed in 2011.

To have illustrated, based on CMIP5 simulations, that natural variability appears capable of producing extreme heat waves as large as or larger than observed in 2011 is of course not the same as stating that natural variability accounts for the total observed magnitude of this particular event. This does, however, confirm that the observed 116-yr record is insufficient to delineate the extremes of natural variability.

The extreme heat waves in the CMIP5 simulations, though statistically random events, were accompanied by a coherent pattern of global SST evolution. To illustrate the evolution of such a pattern, we use the very large sample of CCSM4 runs. In addition to the attributes of having a realistic Texas region climatology, this model is also suitable for analysis because of the realistic pattern of tropical SST variability (Gent et al. 2011), to which Texas climate is well known to be sensitive. Figure 3 (top) shows the composite global SST and U.S. precipitation anomalies that were coincident with the summertime occurrences of the 1 in 100 year heat wave events. Extreme southern plains dryness is seen to accompany these heat waves, as was noted also in 2011 and during past Texas heat waves. Dryness is also noted in the model over the Pacific Northwest, though these departures, shown as standardized anomalies, are small in an absolute sense because they occur during that region's climatological dry season. The JJA SST anomalies in the tropical equatorial Pacific are not particularly extreme, though they are part of a pattern typical of the waning phases of La Niña events, including cool tropical/subtropical SSTs in most basins, and a distinctive North Pacific SST anomaly pattern. Antecedent October–May SST composite conditions for these heat wave events illustrates a mature La Niña structure (Fig. 3, bottom left), and a similar La Niña pattern occurs in several other CMIP5 models that were examined (not shown). Likewise, the antecedent U.S. precipitation anomaly pattern (Fig. 3, bottom right) shows dryness over Texas and the Gulf Coast region, a feature that is consistent with known global climate anomalies associated with La Niña (e.g., Kiladis and Diaz 1989). A similar evolution of cold Pacific SSTs accompanied the 2011 Texas heat wave, and the combination of antecedent and contemporaneous dryness was likewise a particular feature of the 2011 Texas heat wave. It should be noted that the tropical Atlantic SSTs in the CCSM4 heat wave composite for preindustrial runs are cold, which is opposite to the warm conditions occurring during the 2011 heat wave, as discussed further in the next section.

b. *The role of forcing*

Suites of climate simulations are diagnosed to address how anthropogenic forcing, SST forcing, and soil moisture forcings contributed to the 2011 extreme event. It should be noted that SST and soil moisture conditions in 2011 likely possess some anthropogenic component, aspects of which are discussed further below. Figure 4 illustrates the observed pattern of global SST anomalies for summer 2011 (top left) and for the preceding seasons (bottom left). The patterns of SST anomalies are similar to known patterns of natural coupled ocean–atmosphere variability. For instance, the antecedent conditions consisted of tropical Pacific cold SSTs with peak anomalies of −1.5°C, a horseshoe pattern of warm anomalies stretching poleward from the equatorial west Pacific, and cold anomalies extending along the west coasts of North and South America that are characteristic of a mature La Niña event. The tropical SST anomalies weakened considerably by summer as La Niña waned. On the other hand, warm SST anomalies exceeding +0.5°C that

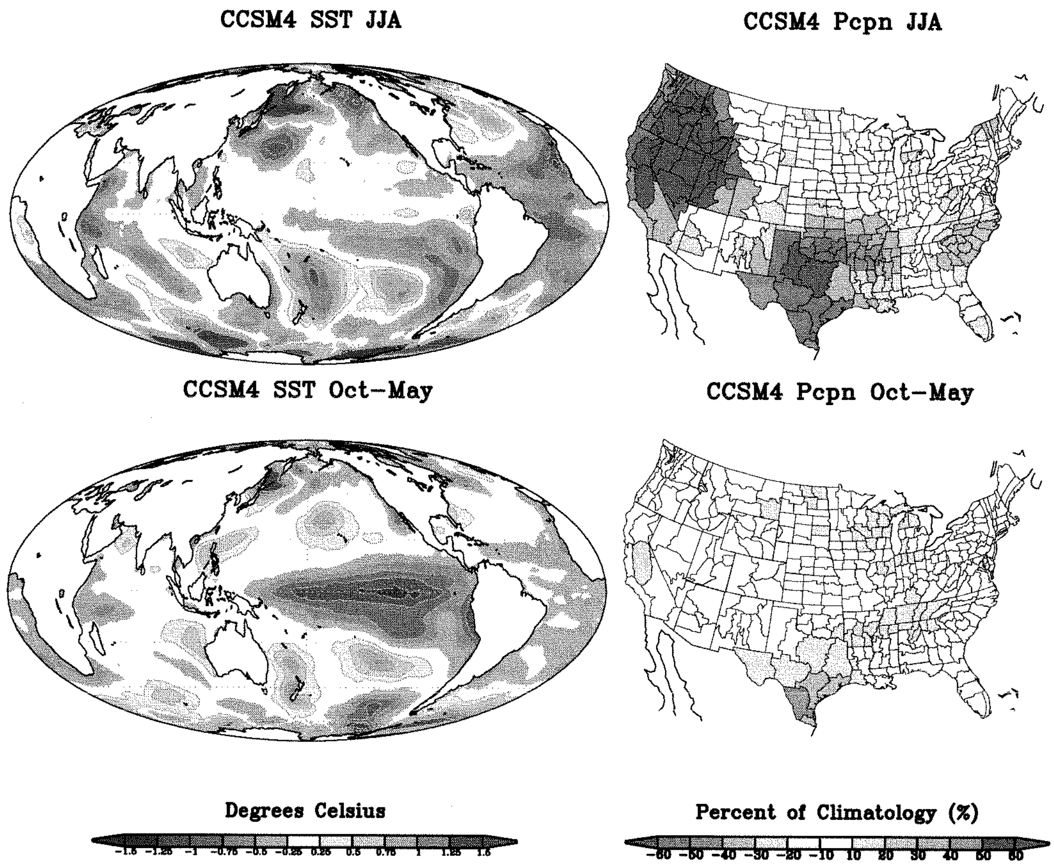

FIG. 3. (left) The 15-case composite SST (°C) and (right) U.S. precipitation anomalies (% of climatology) based on the 1-in-100-yr hottest summertime Texas heat wave events occurring in a 1500-yr simulation of CCSM4. The experiment is an unforced, preindustrial simulation. Shown are (top) contemporaneous conditions for JJA and (bottom) antecedent conditions for October–May. All anomalies are relative to the CCSM4 climatology.

covered the tropical Atlantic Ocean throughout this period were atypical of La Niña. The 2011 warmth of the tropical Atlantic Ocean was more likely related to a combination of lower-frequency behavior that may have included natural multidecadal Atlantic variability and an externally forced global warming trend (Ting et al. 2009).

While no explicit experiments are conducted in this study that constrain evolution of soil moisture, cumulative precipitation serves as a proxy indicator for soil moisture. The U.S. summer 2011 precipitation departures (Fig. 4, top right) and the antecedent deficits accumulated during the prior eight months of the water year (Fig. 4, bottom right) were less than 50% of normal, each breaking records for their driest periods since 1895. These dry conditions are contrary to observed long-term trends in the region, which consist of decreased dryness, with droughts becoming less frequent, less intense, and shorter in duration (Field et al. 2012).

It is not surprising that the hottest summer coincided with the driest summer over Texas in 2011 given the well-known inverse correlation between temperature and precipitation over this region (e.g., Madden and Williams 1978) and various other evidence for strong soil moisture feedbacks on summer climate (e.g., Senevirante et al. 2006; Fischer and Schär 2010; Hirschi et al. 2011). However, the extreme magnitude of the heat wave cannot be reconciled with the extreme summer dryness alone, at least not in a linear sense. Despite the strong inverse relation between Texas summer rainfall and temperature (Fig. 5), a prediction based on this historical data fails to anticipate the extreme magnitude of the summer temperature when accounting for the extreme coincident precipitation deficit. This is indicated by the large displacement between the JJA 2011 observed conditions and the linear fit, even giving reasonable consideration for the scatter about the linear relation.

There is reason to posit that the relation between temperature and precipitation may be a nonlinear function of the soil moisture deficit, for instance as found during summer over southeastern Europe (Hirschi et al.

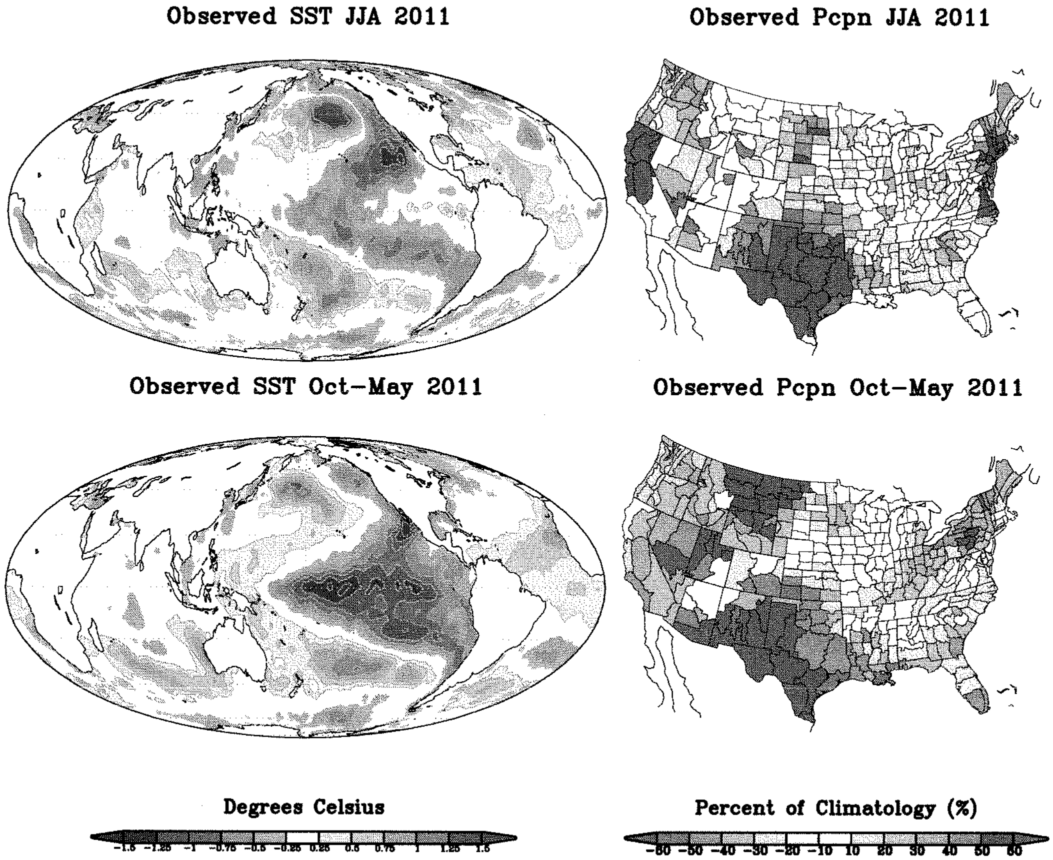

FIG. 4. (left) Observed SST anomalies (°C) and (right) U.S. precipitation anomalies (% of climatology), for (top) contemporaneous conditions for JJA 2011 and (bottom) antecedent conditions for October 2010–May 2011. All anomalies are relative to an observed 1981–2010 climatology.

2011). Also, analyses of historical Texas temperature and precipitation data by Mueller and Seneviratne (2012) find an asymmetrical impact of antecedent drying on the probability of hot summer days, with the hot tail of the temperature distribution more affected by precipitation/soil moisture deficits. Furthermore, aside from the predictive component of temperatures related to antecedent soil moisture impacts, there is also a potential impact of human-induced warming over Texas in 2011.

Figure 6 compares the June–August 2011 observed contiguous U.S. precipitation and surface temperature anomaly patterns (top) with the ensemble mean anomalies from the Atmospheric Model Intercomparison Project (AMIP; middle) and CMIP5 (bottom) simulations (relative to 1981–2010). The forced response to the actual SST conditions captures several of the principal regional features of the 2011 climate conditions. The AMIP simulations indicate, in particular, that the pattern of above normal temperature and below normal rainfall focused on the Texas area was part of a regional sensitivity to that year's SST conditions. Cold tropical Pacific SSTs were likely an important factor in causing southern plains dryness as affirmed in model experiments that have assessed U.S. climate sensitivity to separate ocean basin forcing (e.g., Schubert et al. 2009). Likewise, climate experiments studied by Findell and Delworth (2010) reveal that warm tropical Atlantic SSTs also contribute to southern plains drying, although that sensitivity is weaker than the influence of tropical Pacific SSTs.

In contrast, no such regional specificity emerges in response to the anthropogenic forcing alone. The CMIP5 simulations indicate a mostly uniform surface warming response that spans the entire contiguous United States, indicating that the Texas region was not particularly susceptible (relative to adjacent regions) to the change in anthropogenic forcing. Further, there is no material sensitivity of summer mean precipitation to the anthropogenic forcing over the United States as a whole for 2011. Nor do the CMIP5 simulations indicate appreciable sensitivity of antecedent winter and spring precipitation over the United States (not shown).

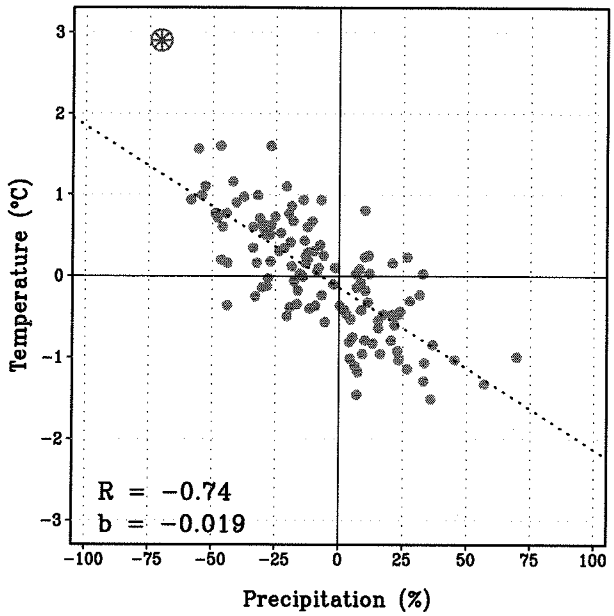

FIG. 5. The historical relationship between JJA Texas averaged rainfall departures (% of climatology) and surface temperature departures (°C). Each dot corresponds to a summer during 1895–2010, and the 2011 value is indicated by the blue wagon wheel. Inset values are for the correlation R and the slope of the linear fit expressed as degree Celsius per percent precipitation departure.

The AMIP forced experiments suggest that a +1.1°C warm signal existed during summer over Texas as a consequence of the particular global ocean conditions in 2011, which implies that approximately 40% of the magnitude of the Texas heat wave (+2.9°C) might have been anticipated as a mean response to forcing related to the specific ocean conditions. The CMIP forced experiments further suggest that a +0.6°C warm signal existed during summer over Texas as a consequence of the projected anthropogenic GHG and aerosol conditions in 2011, which implies that relative to 1981–2010 about 20% of the magnitude of the Texas heat wave might have been attributable to such forcings. The characteristics of these PDFs are summarized in Tables 2 and 3 and discussed further in section 3d. Suffice it to state here that the forcing associated with observed SSTs greatly increased the probability for an extreme dry and hot summer over Texas in 2011, considerably more so than did anthropogenic forcing.

To what extent can the seasonal responses in the AMIP and CMIP simulation suites be interpreted as representing separate and independent forcing effects? While much of the pattern of ocean conditions in 2011 was consistent with natural internal variability, some fraction of the anomaly patterns likely also included a climate change component, and as such the AMIP responses are not necessarily signatures of internal ocean variability alone. Regarding rainfall, however, the results do lend themselves to an interpretation of separate physical forcing factors. In particular, the AMIP simulated drying over the Texas region is likely due to natural SST forcing alone insofar as the CMIP simulations do not yield a discernible precipitation response. This is consistent with the results of other modeling studies that find the global SST trends produce only weak precipitation responses over the continental United States. (Schubert et al. 2009). Regarding temperature, the AMIP simulated warming over the Texas region likely includes a human-induced component via anthropogenic forcing of SSTs; however, the majority of the AMIP simulated warmth resulted from the aforementioned drying signal and the physical relationship between precipitation deficits and hot summers (e.g., Mueller and Seneviratne 2012) The Texas warming in the CMIP simulations is partly due to the direct effect of changed radiative forcing on the region's temperature (a factor not included in the AMIP simulation for 2011), and an indirect effect related to human-induced ocean warming (Hoerling et al. 2006, 2008; Dommenget 2009; Compo and Sardeshmukh 2009).

How robust are the signals derived from this particular suite of model simulations? The structural uncertainty in each signal that would arise from model biases cannot be determined from the present suite of model runs. In particular, additional experiments employing different atmospheric models also run in AMIP mode would need to be analyzed to assess the uncertainty in SST/sea ice signals. Likewise, ensembles of each of the 20 CMIP5 models would be required to estimate the uncertainty in the human-induced climate change response. The current study provides a single indication of the probable human-induced signal in 2011 climate conditions, derived by ensemble averaging single runs of each CMIP model. Additional analyses described further below, however, suggest that this CMIP5 ensemble mean signal is a reasonable estimate of the anthropogenic forcing of Texas summertime temperatures, at least for 2011 relative to 1981–2010.

Aside from estimating the mean value of the forced response, it is also important to diagnose the variability about that mean and thereby assess how deterministic the 2011 Texas extreme event was with respect to forcing. Was the observed occurrence of an extreme heat wave and drought the only outcome possible over Texas in 2011 for the particular conditions of boundary and external forcings? Was it the most likely outcome? Could the JJA 2011 conditions have been even more severe? To address such questions, Fig. 7 shows the frequency distributions of the simulations of JJA 2011 and of the reference period 1981–2010 for AMIP (top)

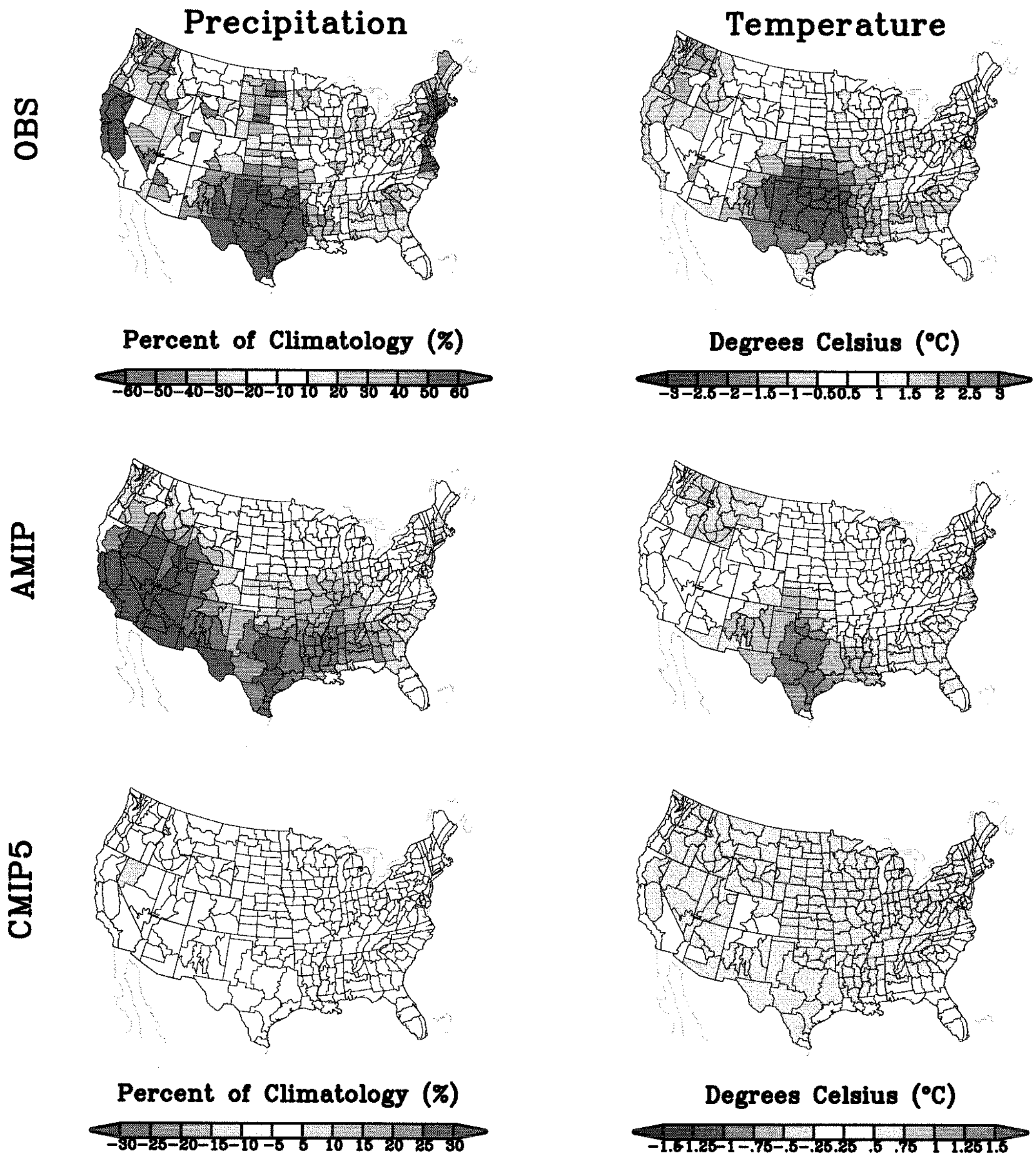

FIG. 6. (left) The JJA 2011 U.S. precipitation anomalies (% of climatology) and (right) surface temperature anomalies (°C): (top) observed, (middle) ensemble mean AMIP simulated, and (bottom) ensemble mean CMIP5 simulated. The AMIP results are based on an 80-member GFS average for 2011, and the CMIP results are based on a 220-member average using 20 different models for an 11-yr window of JJA conditions centered on 2011. All anomalies are relative to the respective dataset's 1981–2010 climatology, and the observed scale of plotted anomalies is double that shown for the simulations. The reference AMIP simulation uses the same GHG concentrations as those specified in the 2011 experiments.

and CMIP5 (bottom). The considerable spread evident in each of the probability distribution functions reveals the appreciable role of random variability in Texas summer climate. For instance, consider the PDFs for 2011 based on the AMIP simulations. Because each of the 80 members was identically forced, the spread of the distributions is entirely due to internal atmospheric noise. Thus, while the odds of a cold summer were much reduced in 2011 compared to 1981–2010, three of the model simulations did produce colder than normal summer conditions over Texas in 2011. The CMIP5 spread for 2011 simulations is greater than the AMIP spread in part because the latter is constrained by a single particular SST conditions, but also because the former has overall greater summertime temperature variability (see Table 3), and an even larger fraction of CMIP5 runs

TABLE 2. The left column shows the simulated JJA 2011 Texas precipitation anomalies for the indicated suite of models based on their ensemble average 2011 simulations relative to a 1981–2010 model reference. The standard deviation of simulated JJA precipitation is the average of the 1981–2010 runs and the 2011 runs. Event probability and return period in the third column is for the exceedance of a less than 50% of normal precipitation deficit. Event probabilities and return periods in the fourth column are for exceeding this same threshold, but based on the distribution of simulations for 2011. The probabilities are calculated from the nonparametric curves of the simulated frequency distributions shown in Fig. 7 for CMIP and AMIP, and Fig. 13 for CFS.

Model	JJA 2011 Texas P_{ANOM}	Model std dev	Event probability (1981–2010) Return period	Event probability (2011) Return period
CMIP5	+0.2%	36.8%	6%	6%
			17 yr	17 yr
AMIP	−33.9%	36.3%	9%	34%
			11 yr	3 yr
CFSv1	−21.5%	36.1%	7%	16%
			14 yr	6 yr
CFSv2	−9.1%	33.4%	5%	12%
			20 yr	8 yr

TABLE 3. The left column shows the simulated JJA 2011 Texas surface temperature anomalies for the indicated suite of models based on their ensemble average 2011 simulations relative to a 1981–2010 model reference. The standard deviation of simulated JJA surface temperatures is the average of the 1981–2010 runs and the 2011 runs. Event probability and return period in the third column is for the exceedance of a 2 standardized departure warming over Texas for the 1981–2010 distribution of simulations. Event probabilities and return periods in the fourth column are for exceeding this same threshold, but based on the distribution of simulations for 2011. The probabilities are calculated from the nonparametric curves of the simulated frequency distributions shown in Fig. 7 for CMIP and AMIP, and Fig. 13 for CFS.

Model	JJA 2011 Texas T_{ANOM}	Model std dev	Event probability (1981–2010) Return period	Event probability (2011) Return period
CMIP5	+0.6°C	1.2°C	3%	6%
			33 yr	17 yr
AMIP	+1.1°C	0.9°C	4%	23%
			25 yr	4 yr
CFSv1	+0.7°C	0.8°C	3%	10%
			33 yr	10 yr
CFSv2	+0.8°C	0.7°C	2%	17%
			50 yr	6 yr

yielded cold summer conditions over Texas in 2011. The important indication offered by these PDFs is that a wide range of possible climate outcomes for Texas in 2011 would have been consistent with, and thus possible under, the influences of forcings. In particular, the observed extreme hot temperature and drought conditions were not the most probable outcomes in 2011, even though the probability of such extremes was greatly increased owing especially to the SST conditions of 2011 (see section 3d). These results once again suggest the important role played by random internal variability, consistent with our analysis of the preindustrial climate simulations.

c. *Physical process understanding*

Here we examine the relationship between Texas summertime temperature and precipitation variability in the context of how their linkages may have been sensitive to the influence of the specific 2011 SST and GHG forcings. Diagnosis of AMIP and CMIP models is conducted to specifically test whether precipitation deficits amplified the hot tails of the summertime temperature distribution. An intercomparison of these forced experiments will also address how the observed record-breaking heat wave arose from physical processes tied to naturally varying ocean conditions versus those tied to increased greenhouse gas and aerosol concentrations. Regarding effects of the latter forcings, the question of detection of a human-induced climate change over Texas is also explored, despite the absence of a century-long warming (or drying) over Texas noted in the prior section.

Figure 8 presents the scatter relationship between Texas summer temperature and rainfall in AMIP (top) and CMIP (bottom) simulations for both the 1981–2010 reference period (left) and the actual forcing conditions of 2011 (right). A strong negative correlation between temperature and rainfall, with a magnitude quite similar to that found in observations, occurs in all the simulation suites. Having the advantage of a large sample of model realizations (720 for CMIP, 360 for AMIP), one can discern nonlinearity in the temperature–rainfall relationship occurring at the tails of the distribution. This is characterized by a larger sensitivity of Texas summertime temperature per incremental precipitation change for dry conditions compared to wet conditions. We also note that the CMIP5 samples include several heat wave occurrences larger in magnitude than the 2011 event during 1981–2010, consistent with the appreciably greater variance in surface temperature in CMIP5 models than is observed (see Table 2).

It is plausible therefore that amplification of the hot tails of the summertime temperature distribution was an important physical process associated with the extreme 2011 Texas event. Additional evidence to this effect is seen in the scatter relationships for the model simulations of summer 2011. Note in particular that virtually all AMIP realizations were warm *and* dry (Fig. 8, top right). A small cluster of AMIP realizations

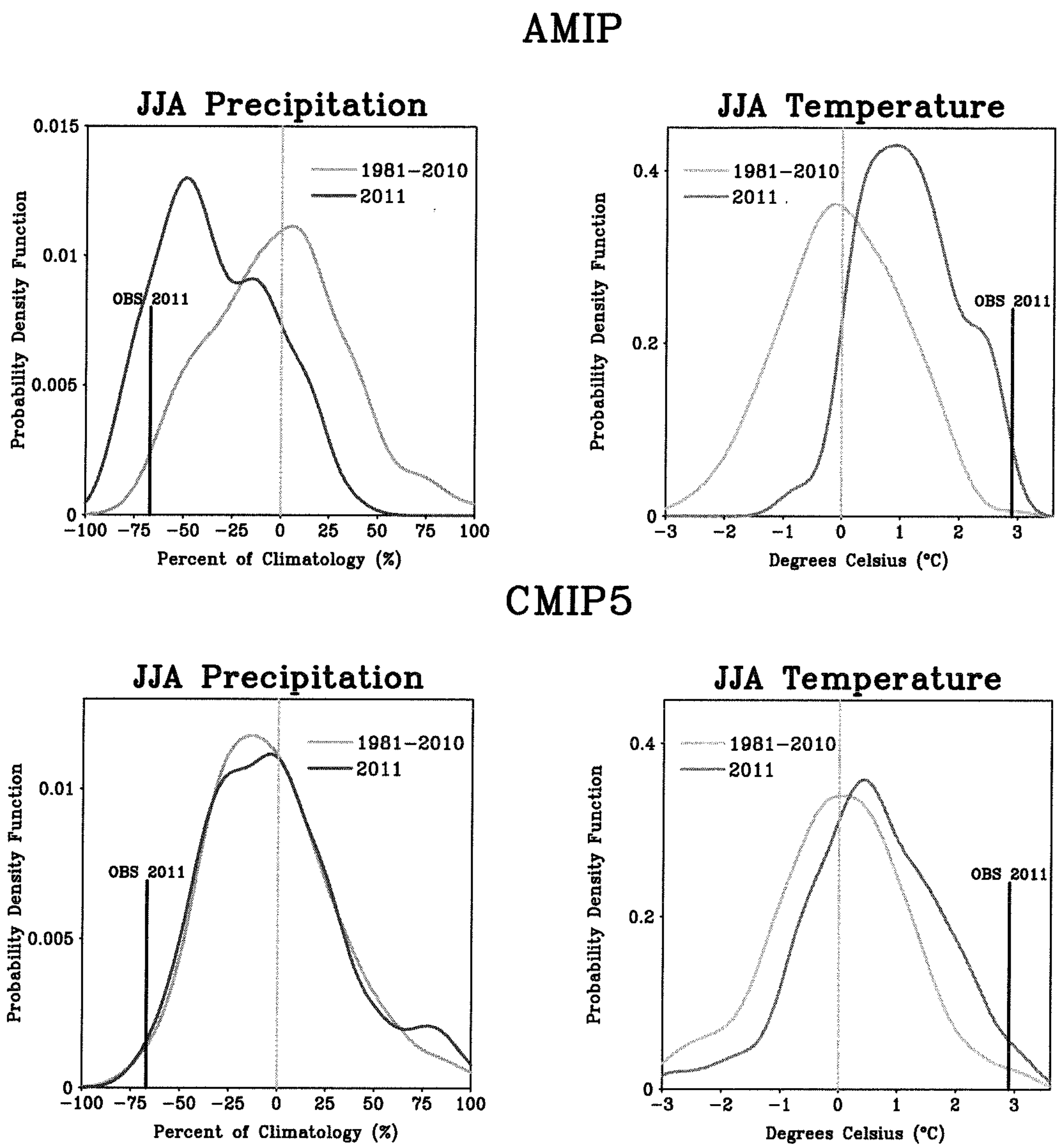

FIG. 7. PDFs of the (top) AMIP and (bottom) CMIP5 simulated summer Texas (left) precipitation anomalies (% of climatology) and (right) surface temperature (°C). Each panel plots two curves, one for the frequency distribution of simulations during 1981–2010 and the other for the frequency distribution of simulations during 2011. For CMIP5, 600 (220) individual simulations are used for 1981–2010 (2011). For AMIP, 360 (80) individual simulations are used for 1981–2010 (2011). The vertical gray tick marks denote the observed 2011 anomalies. All departures are relative to a 1981–2010 reference. The PDFs are nonparametric curves constructed using the R software program, which utilizes a kernel density estimation and a Gaussian smoother.

produced summertime temperature departures near the observed heat wave magnitude, and these realizations were also among the driest. By contrast, the 2011 CMIP5 scatter is characterized by a shift in only the temperature probability relative to its 1981–2010 population. However, one again sees a few individual members as hot as observed, and these are also among the driest CMIP realizations. Severe drought thus appears to be a necessary ingredient for occurrences of Texas summertime extreme heat. While the SST forcing of 2011 increased the probability for below normal precipitation, it is important to recognize also the substantial random component of the summertime conditions over Texas as revealed by the PDF spreads in Fig. 7 and the scatterplot in Fig. 8. This is quantified in Table 2, which indicates that the AMIP mean drying signal of −34% was equivalent to only one standardized departure of the model's overall interannual variability.

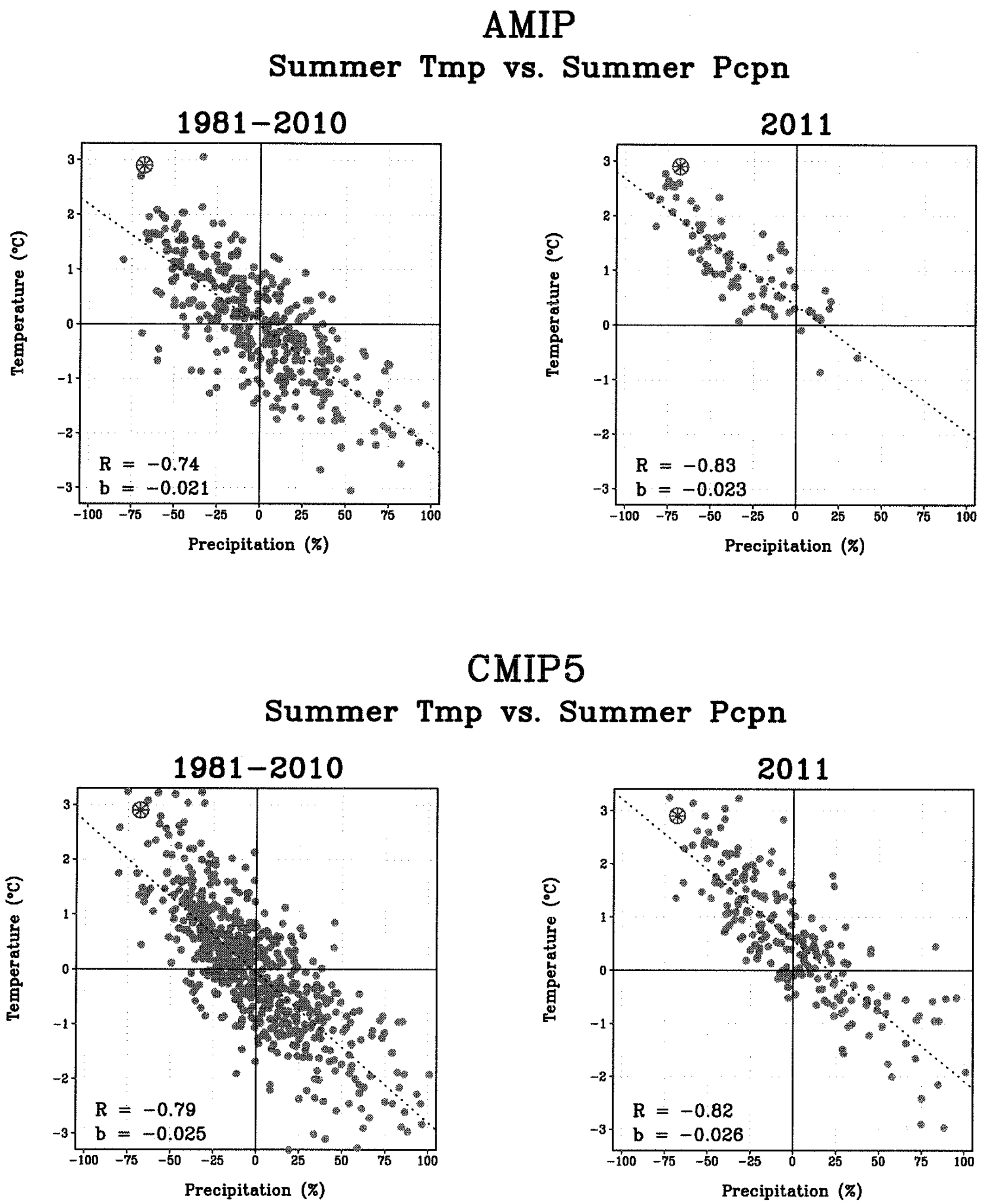

FIG. 8. The (top) AMIP and (bottom) CMIP5 simulated relationship between JJA Texas averaged rainfall departures (% of climatology) and surface temperature departures (°C). Left (right) panels show the relationship for 1981–2010 (2011). Each dot corresponds to the temperature/precipitation for a particular model realization. For AMIP, there are 360 (80) realizations for 1981–2010 (2011). For CMIP, there are 720 (220) realizations for 1981–2010 (2011). Inset values are for the correlation R and the slope b of the linear fit expressed as degree Celsius per percent precipitation departure. The blue wagon wheel denotes the observed JJA 2011 values.

We also find that SST forcing exerted an even greater effect on antecedent moisture conditions. Texas cumulative precipitation departures from October 2010 through August 2011 (Fig. 9) are plotted for the 80-member averaged AMIP data (thick black line) and for observations (thick red line). About 80% of the magnitude of observed deficits accumulated during fall and winter can be explained by an SST-forced signal. Such antecedent dry conditions likely contributed significantly to the ensuing summer heat wave intensity, and